♦ Enabling New Service Provider Business Models with the IP Multimedia Subsystem

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With declining revenues, cross-segment substitution, and new competition that bundles voice with other service offerings, traditional telephony business models are under attack. As a services architecture, the IP Multimedia Subsystem (IMS) enables new service provider business models for both current telephony and new revenue-generating service offerings. This paper discusses three potential models for creating value via business partnering "ecosystems" enabled by IMS and then compares these models to a traditional service provider business model.

Introduction

The global telephony industry is undergoing massive disruption as it deals with the business implications of convergence, especially with the greater cross-elasticity of wireless and wireline, data and voice, and circuit and packet-based technologies. Wireless operators are raiding wireline markets with substitution offers. New industry entrants are challenging the traditional business model with new offers (e.g., bundled video entertainment, Internet data and voice services), advanced features, and/or radical pricing structures (e.g., Vonage* service's flat-rate unlimited voice calling [10], Skype* service's free unlimited global in-network voice calls [8]). Some industry players wholesale their network capacity to other providers that focus on specific market segments. The applications service provider (ASP) business model is experiencing a re-birth with voice over Internet Protocol (VoIP) services and similar applications hosted via the Internet. Fundamentally, all types of service providers are pursuing the same end-user spending, driving down the unit price of all voice services.

The IP Multimedia Subsystem (IMS) is an industry standard, initially developed by the 3rd Generation Partnership Project (3GPP) [1] and 3rd Generation Partnership Project 2 (3GPP2) organizations primarily as an IP-based network architecture for cellular/wireless operators (replacing the traditional functions in a circuit-based mobile switching center). The International Telecommunication Union (ITU) has chosen to start with IMS to specify a next-generation network (NGN) standard architecture for delivering lower-cost advanced revenue-generating services for all types of service providers [5], including inter-exchange carriers (IXCs), local exchange carriers (LECs), cable operators, and ASPs. VoIP is just one of many services enabled by an IMS architecture.

IMS as a Services Architecture

Traditional telephony networks have the end-user services functionality (the telephony application) inseparably embedded in a core network switch. With intelligent networking (IN) technology, enhanced telephony capabilities can be built external to these

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switches, but services are still closely tied to the core network via Signaling System 7 (SS7) signaling. IP-based networks enable the end-user functionality (i.e., software applications like Web and e-mail servers) to be flexibly located and available from wherever in the world the user is able to access the public Internet.

The IMS architecture and its particular use of Session Initiation Protocol (SIP) as a powerful signaling protocol extends the flexibility of the IP model in several ways. Independent of access network technology, the IMS architecture:

- Establishes methods for subscriber identification, authentication, authorization, routing, session control, and accounting for usage of network resources, as well as methods for exchanging this information across multiple network operators;
- Standardizes the interfaces that applications use toward the core network, allowing multiple IMS applications to share data (including provisioning and billing data) and "blending" these applications such that they may simultaneously provide services to a single subscriber; and
- Provides methods to dynamically assemble end-to-end quality of service (QoS) data sessions based on an application's needs and the available intermediary network resources, as well as the end devices' capabilities, such that VoIP and multimedia, real-time, latency-sensitive types of services can be delivered over IP networks.

These and other IMS mechanisms enable delivery of VoIP telephony and many other types of applications to a services provider's subscribers. For example, IMS extends the concept of roaming agreements. Roaming subscribers can access and use their home network's services via SIP signaling from any IP access network, including the pubic Internet. When the access network being visited by the subscriber is also an IMS-compliant network that has a partnering agreement with the subscriber's home service provider, then local network resources may be used by the home applications for routing and QoS of the bearer path, for media processing, and/or for gateway connection to the public switched telephone network (PSTN).

Panel 1. Abbreviations, Acronyms, and Terms

3GPP—3rd Generation Partnership Project
3GPP2—3rd Generation Partnership Project 2
ASP—Applications service provider
COGS—Cost of goods sold
IMS—IP Multimedia Subsystem
IN—Intelligent network/networking
IP—Internet Protocol
IT—Information technology
ITU—International Telecommunication Union
IXC—Interexchange carrier
LEC—Local exchange carrier
NGN—Next-generation network
PBX—Private branch exchange
PSTN—Public switched telephone network
QoS—Quality of service
SS7—Signaling System 7
VoIP—Voice over Internet Protocol

Service Provider Ecosystems

The IMS standards support service interoperability across network operators and define open interfaces between network components to ensure equipment interoperability across suppliers. A business aspect of industry standards means service providers can obtain standardized components at lower cost through competitive bidding by suppliers. With a common layer 4 mechanism (IP) and management model across the network components, IMS networks will also have lower operations costs. Furthermore, this is an example of a customer-supplier type of value chain, where the service provider establishes its business model via capital investment and operation of the purchased equipment.

When the business relationships in an industry are somewhat more complex, the term *ecosystem* is often used. Most IMS applications are SIP-based, and, as a result, more new application developers now exist than traditional switching equipment suppliers or IN/SS7 developers. One conjecture is that SIP-based software development has a large base of programmers available at lower cost because there is less need for rare or proprietary knowledge to create valuable functionality. Additionally, application developers have the opportunity to license and price their software

products on per-user or usage basis, rather than requiring a large initial capital purchase. In this manner, they may partner with a service provider, sharing in the initial risk (investing in the application software) and also sharing the potential rewards (increased revenues for both partners as subscriber usage increases). Note that content developers (e.g., studios, artists) frequently price their products to distributors in a similar manner. Typically, corporations account for these revenue-sharing partnerships as costs of goods sold (COGS), above net revenues in their income statements, rather than as capital expense. Another type of ecosystem partner—a managed service provider—purchases and operates the high reliability computing platforms that host these applications, either within the service provider's own network or in a separate datacenter.

Service Provider Business Models

When selling services to an end-user, a service provider needs within its business model the following eight significant elements (see **Figure 1**):

Brand—A marketing image of the service provider perceived by the end user/buyer.

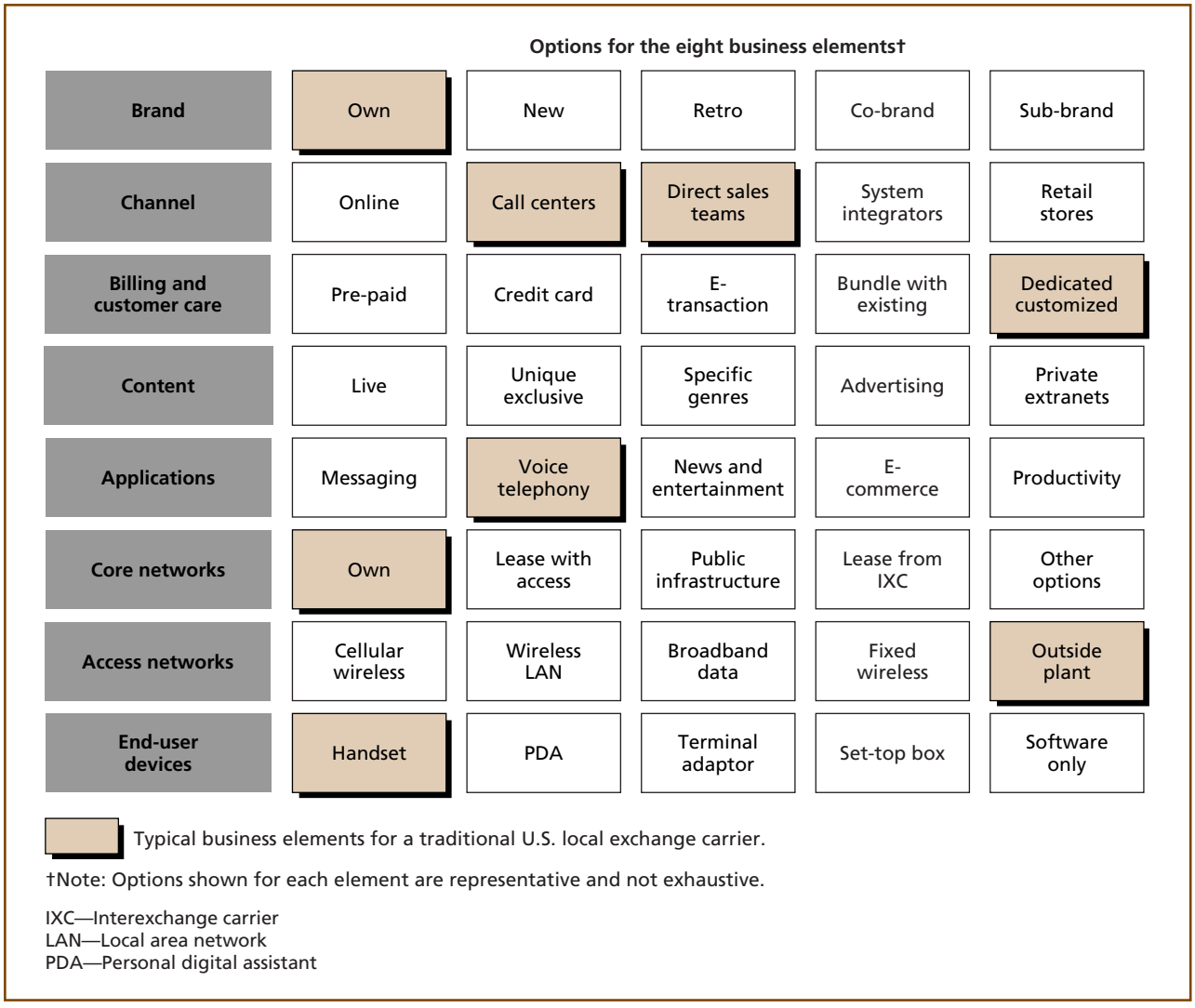

Figure 1.
Examples of options for assembling a service provider business model when selling to end users.

Channel—The place in which or medium through which the user buys the service.

Billing and customer care—The methods by which the user pays for the service and by which the user interacts with the provider post-purchase.

Content—Creative intellectual property/media with end-user appeal and value (not all services require separate content—e.g., traditional telephony).

Applications—Functional implementations of the features and services the user is paying for (these implementations provide packaging around content when such is part of the service).

Core networks—Highly interconnected networks of resources that route and process the end-users' traffic among multiple devices, access networks, and applications.

Access networks—"Last mile" networks that connect devices to a core network.

End-user devices—Hardware and client software with which the user physically interacts when using the service.

Multiple instances of each element are possible via internal operations, purchases from suppliers, and/or via ecosystem partners. Some simple pre-IMS examples include:

A traditional service provider partnering with peer operators for network capacity when a subscriber's call terminates beyond the bounds of its own network geography, and

Wireless providers partnering with each other when one provider's subscribers roam into and obtain use of local services when visiting in the other provider's network coverage.

The partnering model is also the norm in the cable TV industry, where the network operator is also often a content owner, distributing through other service providers as well as through its own cable network.

Business Models Enabled by IMS

The eight elements delineated above are used to describe three potential business models and possible strategies that are available to service providers with an IMS services architecture. These elements represent significant areas of potential investment and partnering. While partnering reduces the net revenue the service provider may receive, it requires less capital investment to launch new services or enter new markets. A key strategic issue will be how a service provider competes with others who may have some or all of the same partners. Therefore, for each model, differentiation strategies are also briefly discussed.

Model A: Converged Service Provider

A service provider that combines access networks and valuable end-user services should have strong appeal ("one-stop shop"), especially with a trusted brand name and positive user experience with easy-to-use devices and applications. By aggregating multiple access networks with IMS though roaming (fixed and mobile, locally and when traveling), subscribers have global use of their services without paying separately for access. Converged service providers have many options for the components in their business model (see **Figure 2**). Significant partnering provides a broad service portfolio. Internally developed components or components with exclusivity may be expensive, but they are needed for differentiation against other competitors with converged services. For high-volume commodity services or content, multiple partners and the ability to move traffic between the partners can help the service provider lower costs. Because this business model demands high investment and high volume, there are likely be only a few large players in this niche of the ecosystem.

Model B: Wholesaler and Retailer

A wholesale business model (see **Figure 3**) sells bulk network capacity and related services to retail service providers, who will typically focus primarily on their own brand and channels. In the IMS architecture, almost all network components are designed to be shared across multiple services, and only the home subscriber server is provisioned with subscriber-specific information. Shared media servers, media gateways, and application servers can be found today in pre-IMS wholesale core network operators. A pre-IMS retail business example is the mobile virtual network operator who buys wholesale wireless minutes from mobile network operators (e.g., 7-Eleven* Wireless [2]). Retail service providers will find value

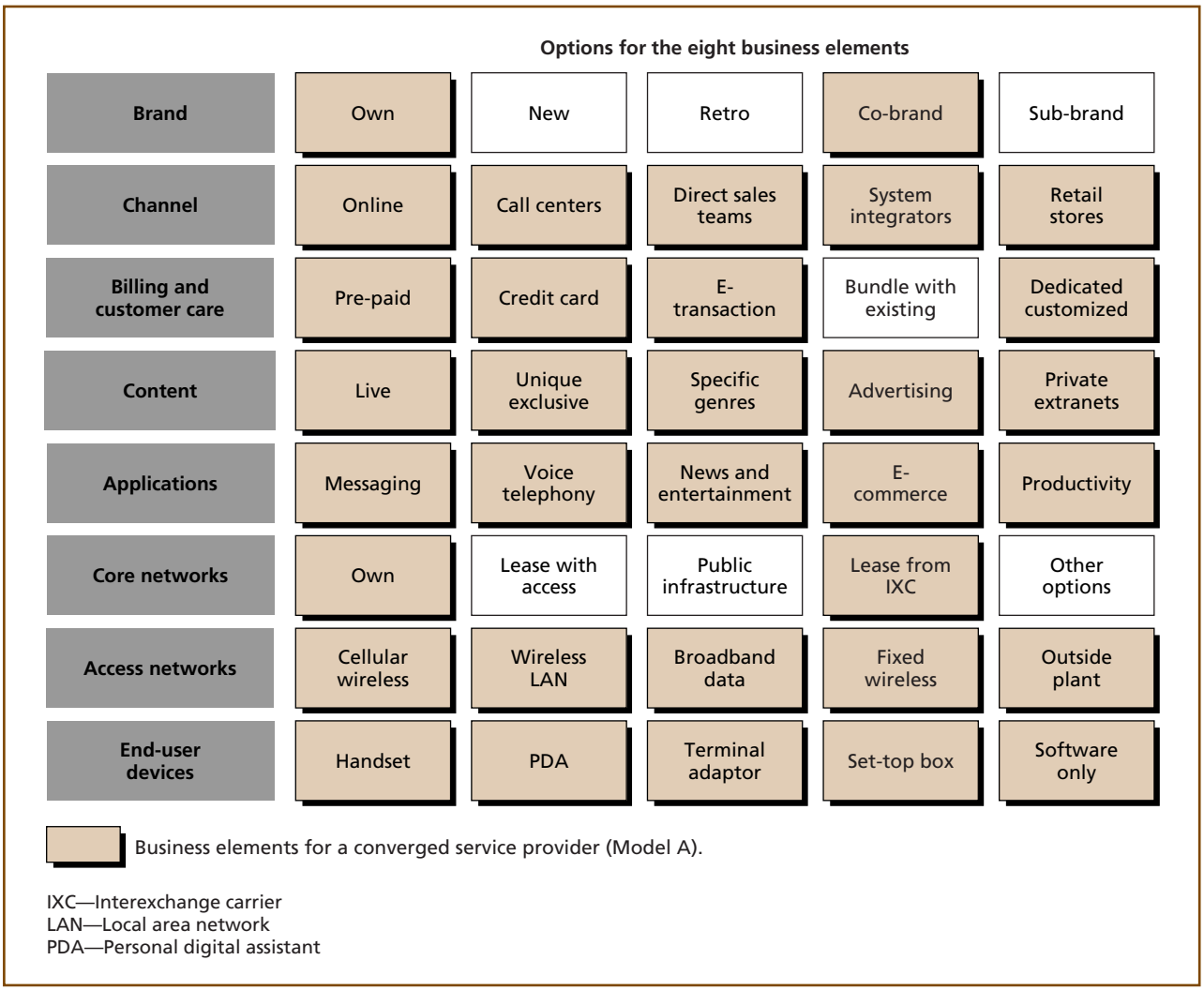

Figure 2.
Example of options for converged service providers.

in partnering with wholesalers that have global connectivity; such partnering will reduce their risk, lower their cost, and improve their time to market. There are likely to be many retail service providers, some with broad appeal and some with niche appeal, but each leveraging unique brands and channel strengths.

The wholesale business model is most typically seen today for core and access networks, but there are also more recent examples in the areas of customer care, billing, and device fulfillment (e.g., mobile virtual network enablers). Typically, a wholesaler must focus on economies of scale and performance aspects for differentiation. By supporting multiple retail service providers, the wholesaler lowers its own risk by leveraging the market diversity and strengths from the multiple brands and channels of the retailers. Because this is a cost- and quality-differentiated business model, the wholesaler's margins will be tight and there are likely to be only a limited number of long-term successful network wholesalers in the ecosystem.

Model C: Applications Service Provider

An ASP business model (see **Figure 4**) primarily focuses on the applications, content, and perhaps a

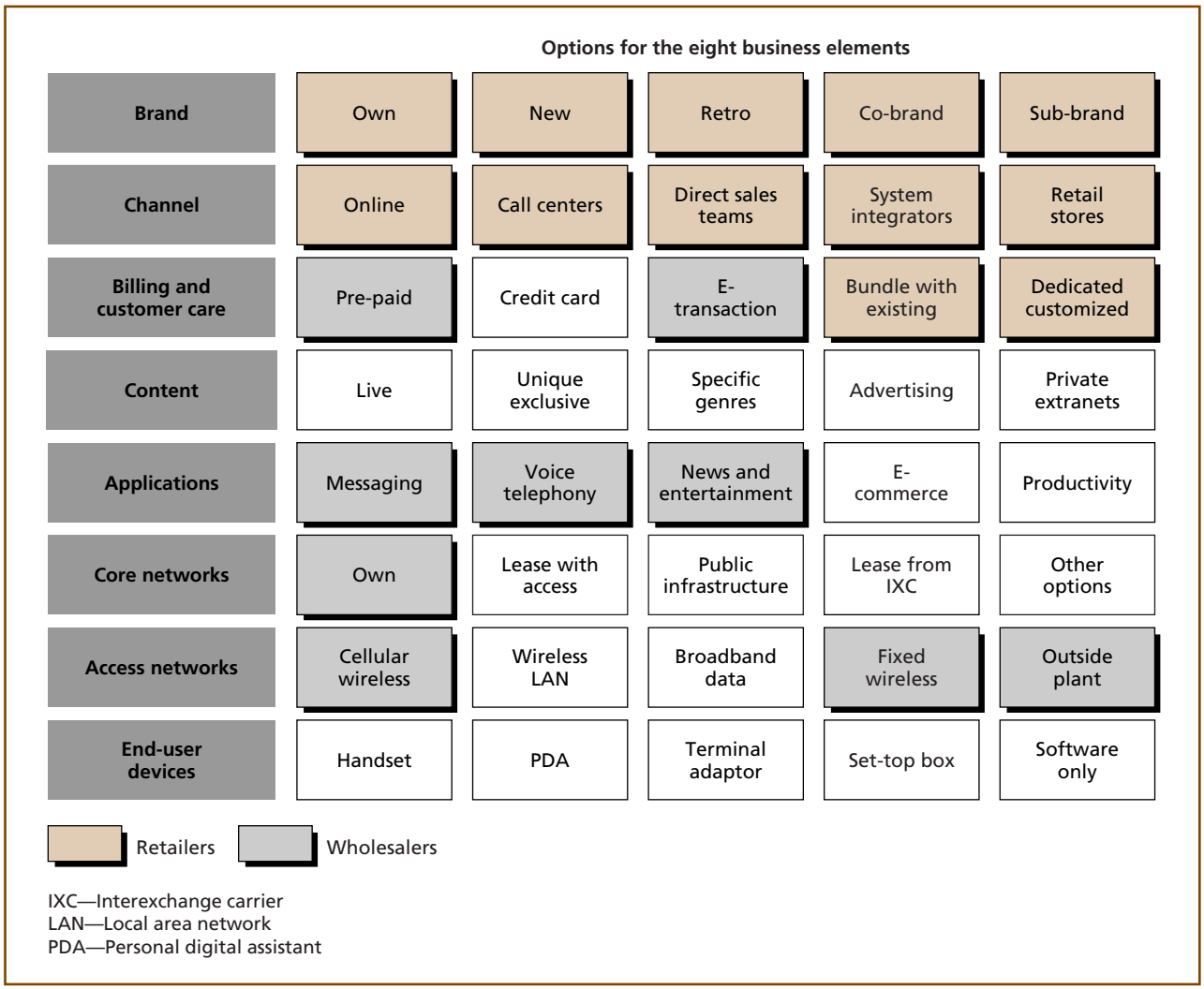

Figure 3.
Example of retail and wholesale business model.

dedicated device, generally without owning any network in the traditional sense. ASPs may also be wholesalers, and/or retailers (e.g., if have their own brand, channel, billing, customer care). The retail ASPs may lease access and core networks from wholesalers, or they may use the public Internet. Vonage is an example of a retail ASP delivering a pre-IMS VoIP application where subscribers separately purchase their own broadband Internet access (a.k.a. "Bring Your Own Access"). Other ASPs are the "behind the curtain" wholesale partners to service providers who market multiple services to end users. The ASP's differentiation could be a specific device or application, and/or the differentiation could be unique content. An ASP may add new features to an existing application (e.g., AOL* VoIP services [3]), device (e.g., a BlackBerry* handheld wireless device [7]), or system (e.g., the OnStar* in-vehicle safety and security system [6]). ASPs may target a specific segment with content (e.g., ESPN* Mobile for sports fans [4], Virgin Mobile* for the youth market [9]). With low barriers to entry and the large potential for innovation and differentiation with IMS applications and content, there are likely to be many ASPs in the ecosystem.

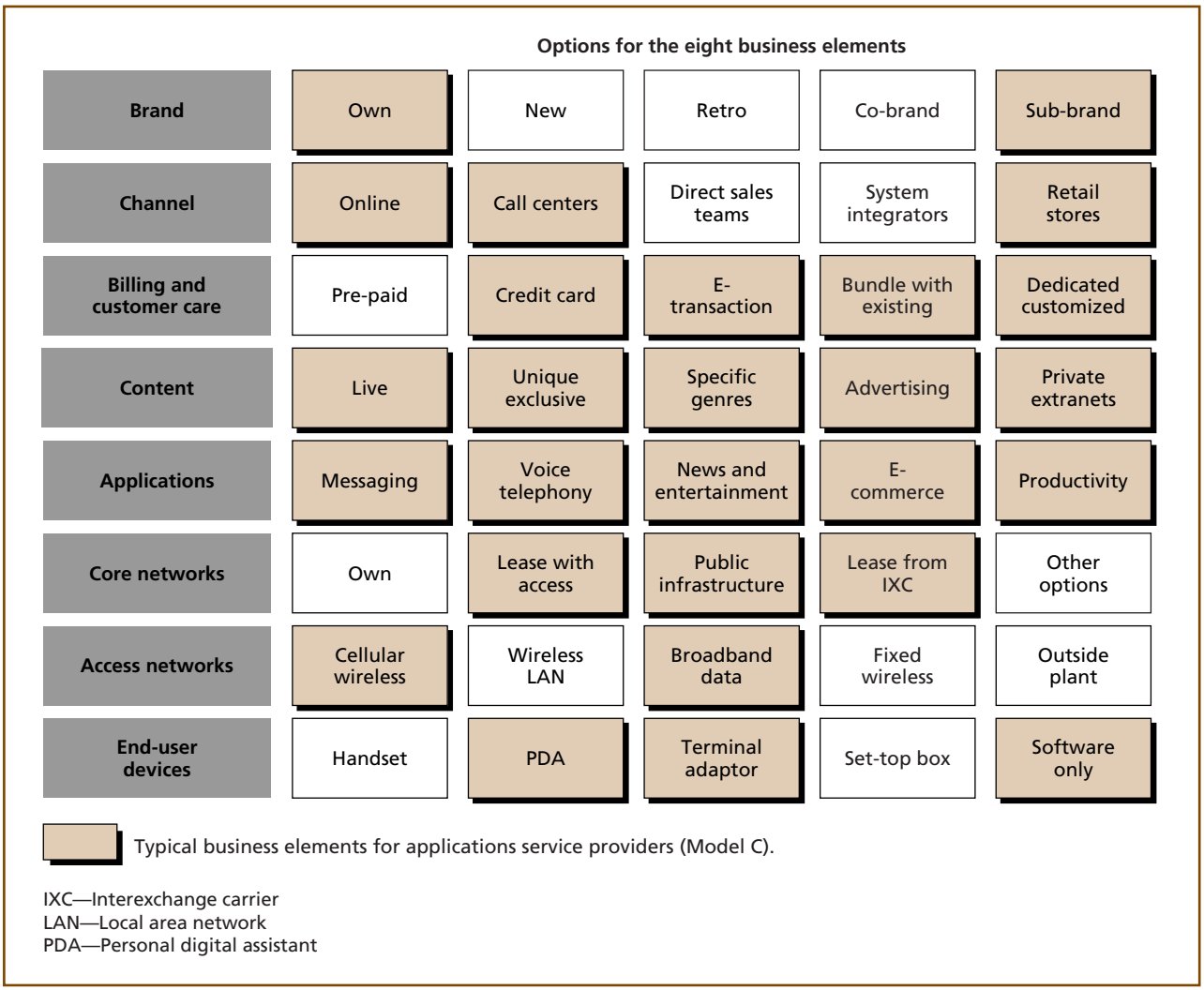

Figure 4.
Example of applications service provider business model.

Situational Analysis

With an IMS services architecture, service providers have new opportunities to pursue end-user spending for higher value services in areas such as entertainment, commerce, and business collaboration and productivity. Using a standards-based IP infrastructure, an IMS architecture enables service providers to offer traditional applications such as voice and messaging services in a lower cost structure. Additionally, through easier integration of multiple applications from multiple suppliers or partners with the operator's network and also with billing and provisioning systems, IMS enables greater innovation and rapid realization of new services. Furthermore, IMS enables a service provider to offer these services and collect revenue from subscribers beyond the traditional geographic boundaries of their own networks to anywhere in the world (depending on legal and regulatory issues) over an IP connection on most any access network technology, fixed or mobile. With peering/roaming agreements in place between service providers, a subscriber outside home network coverage can use his/her home services and get the performance advantage of the local IMS network resources with QoS (e.g., PSTN

calls, media servers, Internet access) without having to separately purchase local access.

This separation of service offerings from geographic coverage means that service providers will compete in a greatly expanded, single global marketplace. The industry will not be segmented by network type as in the past. Cable operators, LECs, IXCs, mobile operators and new access network entrants (e.g., fixed wireless, Wi-Fi* technology, WiMAX* technology) will all compete for the same subscriber revenue, using a variety of business models. Internet-based applications providers (e.g., Vonage, Yahoo!* [11]), as well as IT systems integrators, are already selling services to consumers and/or enterprises without owning an access (or core) network at all. This model can satisfy those users who will pay separately for IP access, use premises-based applications (e.g., IP-PBXs), or peer-to-peer applications (where all functionality is within the end-devices). However, services offered from IMS service providers will be able to provide greater functionality, broader coverage via roaming partnerships, end-to-end QoS, and a more consistent user-experience, therefore delivering more value that subscribers will pay more for. Of course, IMS service providers must still differentiate themselves in the market, so how they assemble their business model within the ecosystem will be critical to their success.

Conclusions

Existing service providers and business models will undergo a fundamental business transformation to survive the competition with new types of service providers already appearing. With limited capital to invest, service providers, regardless of their starting point, will be driven to significant partnering within the industry ecosystem. Using the standard IMS services architecture, three possible ecosystem business models have been described. While the current industry situation will be disruptive to some, it also provides significant opportunity for creating greater value and new industry revenue growth. Service providers will need to leverage a next-generation network IMS architecture and their own ecosystem of strategic and innovative partnerships in their transformed business model.

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