

**booz&co.**

---

Convergence  
In China

*Profiting from the  
Next Wave of the  
Information Age*



---

---

Booz & Company is a leading global management consulting firm, helping the world's top businesses, governments, and organizations.

Our founder, Edwin Booz, defined the profession when he established the first management consulting firm in 1914.

Today, with more than 3,300 people in 58 offices around the world, we bring foresight and knowledge, deep functional expertise, and a practical approach to building capabilities and delivering real impact. We work closely with our clients to create and deliver essential advantage.

For our management magazine *strategy+business*, visit [www.strategy-business.com](http://www.strategy-business.com).

Visit [www.booz.com/cn](http://www.booz.com/cn) to learn more about Booz & Company in Greater China.

---

## CONTACT INFORMATION

**Edward Tse** is managing partner with Booz & Company in Greater China. He specializes in market entry, growth strategy, organization, transformation, M&A and alignment for companies in the telecommunication, high technology, manufacturing, media and entertainment. He can be reached at [edward.tse@booz.com](mailto:edward.tse@booz.com).

**David Artero** is a senior associate with Booz & Company in Greater China and a member of the communication & technology practice's Telecommunications Technology Team. He specializes in industry strategy, technology development, strategy review and technology strategy development for companies in the telecommunication. He can be reached at [david.artero@booz.com](mailto:david.artero@booz.com).

Originally published as:

*Convergence in China: Profiting from the Next Wave of the Information Age*,  
by Edward Tse, David Artero, Booz Allen Hamilton, 2007.

# Convergence in China

## Profiting from the Next Wave of the Information Age

In the history of business and technology, certain major trends—from the widespread adoption of electricity to the mass marketing of the automobile—have affected so many people in such a profound way that they have changed the world as we know it. Some companies were able to catch these trends and go a long way; others failed to catch up and faded away.

The information revolution has already proven it is one of those epoch-defining trends, so has the media revolution. But these two major trends have not yet peaked. Rather, they are on the threshold of their next stage: convergence. This next stage only became possible recently, after fundamental changes in the past decade transformed the market dynamics of the telecommunication, media, Internet, hardware, and software industry sectors.

The first breakthrough was the development of new enabling technologies that make Internet Protocol (IP) an effective communication mechanism for multimedia services. This sea change opened the door for a range of information and media companies to combine the functions of their products and services, potentially creating endless new and tailor-made products.

The second fundamental change was the evolution in demand for communication, information, and entertainment services. Consumers have always wanted to use and enjoy a variety of information services without having to carry half a dozen devices and deal with a dozen vendors. Now that possibility is on the horizon, and consumers are reluctant to accept anything less.

These two factors paved the way for convergence in the information and media industries. The onus is now on companies to grasp the opportunity: Successful convergence products could regularly capture a large chunk of a consumer's spending, both for personal and business purposes, thus bringing in stable revenue with good potential for growth.

### **Policy Change May Open the Door in China**

In the past, convergence in Mainland China was restricted by government regulations. Fortunately, this is bound to change because the government has now explicitly endorsed convergence as a major technological trend: China's 11<sup>th</sup> Five-Year Plan stated in the country's strategic guidelines that China should foster the convergence of telecom, Internet, and cable TV networks. The progressive liberalizing of policy barriers will trigger significant changes in the telecommunication and information industries, bringing in new challenges and opening up new opportunities.

We believe that the key to success in the converged market lies in the ability to transform businesses on three levels:

- On the structural level, companies need to enter new business lines, position themselves as triple-play players, and build technologies and create innovations to support those changes, such as adding wireless or fixed-line technology capabilities.
- On the customer level, companies must address the customer's expectations of lower price, better quality, and more diversified choices, embodied in simpler products and services.

- On the competitive level, companies have to differentiate themselves from local and international players to succeed in the increasingly crowded market.

To address the issues on these three levels, companies will have to broaden their value chain—whether through organizational restructuring, partnerships, acquisitions, or some combination thereof. Some Chinese companies are beginning to do that, as illustrated in the latter part of this article, which analyzes how the main sectors within the convergence space are coping.

### Drivers of Convergence

To assess the implications of convergence, we need to understand its nature and origins. There are three major drivers behind convergence in China:

1. **Technology drivers**—the emergence of technology enablers or trends that impact communications devices and media
2. **Customer demand drivers**—the evolution in people's demand for communications and multimedia services
3. **Political drivers**—the government's ambition to propel China into the twenty-first century with modern communications infrastructure and services

*Technology drivers.* A key driver for convergence is the development of new technologies that enable the fixed and wireless worlds to come together. Within the next five years, new generations of affordable, highly integrated digital processors and radio components are expected to be developed, with high performance and low power consumption.

The next generation network (NGN) architecture is designed to provide an all-IP infrastructure for multimedia IP-based services. Such architectures are being considered in China. The rollout of IP multimedia subsystems (IMS) with these architectures would simplify the current silo-based service delivering mechanism by creating a layered service delivery concept that would maximize the reuse of existing resources and minimize the development and implementation time for new services. Thanks to IMS, the same service architecture is effective whether the end user is using fixed-line or wireless access

technology on an Internet-connected computer or mobile phone.

Moreover, improvements in media streaming (e.g., RTSP<sup>1</sup>) and compression algorithm (e.g., MPEG-4<sup>2</sup> or AVS<sup>3</sup> for China) have enabled contents to be compacted and transported in a more efficient way. An increasing number of traditional media, including books, newspapers, audio, and video, is now being made available in digital compressed formats, such as Google's effort to digitize millions of books and Apple's iTunes portal to sell audio and video contents.

These technical developments are making possible the transport of high-quality/high-definition audio and video streams onto IP networks accessible from both fixed and wireless devices.

On the terminal side, fixed-line devices that are traditionally data capable, such as laptops, are getting smaller and have become more popular since broadband capabilities have been embedded in them. In parallel, wireless devices that are traditionally voice capable have integrated more functions (e.g. data, video), blurring the boundary with fixed-line products. The increasing interoperability between devices has been a key deciding factor for end users in their adoption of convergence.

*Customer demand drivers.* Today, city dwellers' work and lifestyle rely on products and services already in the convergence space, such as broadband Internet, cable TV, mobile voice and data, fixed-line voice and data, hardware, software, and all types of media contents. But as new technological innovations emerge and existing technologies improve, end users become more demanding.

In China, the demand for mobility is strong, with a compounded annual growth rate for mobile users at more than 18 percent since 2002. The case for convergence for the wireless sector is already substantial because mobile users have developed more sophisticated needs beyond voice communications. An online survey by portal Sohu.com found that 36 percent of respondents want mobile data and games on their phones, while 20 percent want mobile TV services.

Interactivity is also a key requirement, with services such as short message service (SMS), instant

<sup>1</sup> Real Time Streaming Protocol.

<sup>2</sup> Motion Picture Expert Group Version 4.

<sup>3</sup> Audio Video Coding Standard possible alternative codec to H.264/AAC/Vorbis and is meant to potentially replace MPEG-2.

messaging (IM), and online gaming all enjoying healthy annual growth rates of more than 20 percent since 2002. Among customer expectations, “friendliness of the user interface” is one of the most important (37 percent want it), while “built-in menu” and “simple function keys” are also highly valued.

Most people are receptive to the value of services delivered by telecom operators. Forty percent of mobile subscribers are willing to pay higher fees for better services, such as games, TV, or music on the go. Some popular blog sites, or user-created content-hosting portals, are welcoming 10 thousand to 20 thousand new subscribers every day to their millions-strong community of users.

*Political drivers.* Underpinning technology and customer demand is the government’s determination to bring about convergence. In its 11<sup>th</sup> Five-Year Plan, China has defined the goal of fostering convergence of the telecom companies, Internet players, and cable TV networks, in order to strengthen the construction of information infrastructure, such as broadband communications networks, digital TV networks, and next generation Internet.

To bring this about, however, there ultimately needs to be a restructuring of the regulatory environment.

The governance structure and power sharing of organizations such as the Ministry of Information Industries (MII) and the State Administration of Radio, Film, and Television (SARFT) will need to be redefined, with a redistribution of roles and competences to ensure no overlap of authority that could hinder the development of convergence.

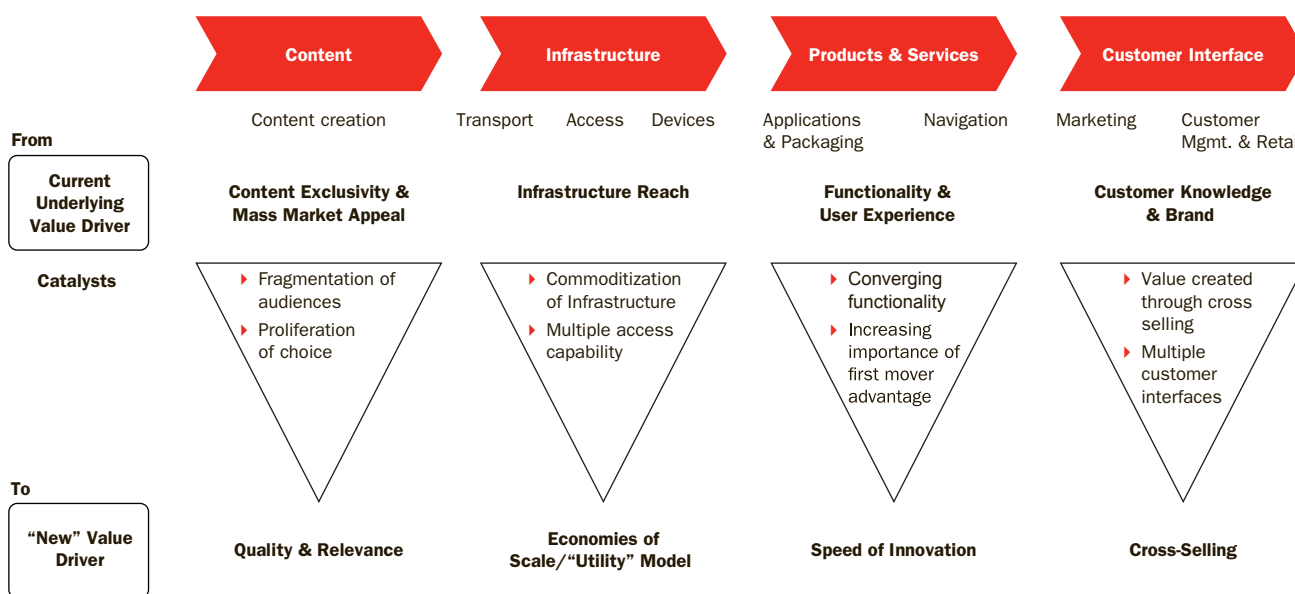
**Implications**

These three developments are, in different ways, catalysts in transforming the way communications services and media content are delivered. Through convergence, communication services and media contents can be delivered through a single IP platform. This technological evolution is enabling the unbundling and restructuring of the value chain across various industries.

At the same time, empowered consumers will have more participatory roles, leading to more fragmented demand. As a consequence, the underlying economics of different business models across the value chain are changing dramatically (see Exhibit 1).

Understandably, convergence is bringing new levels of complexity to players across the affected industries as the customer environment changes. With more choices

**Exhibit 1**  
Shift in Underlying Economics



Source: Booz Allen analysis

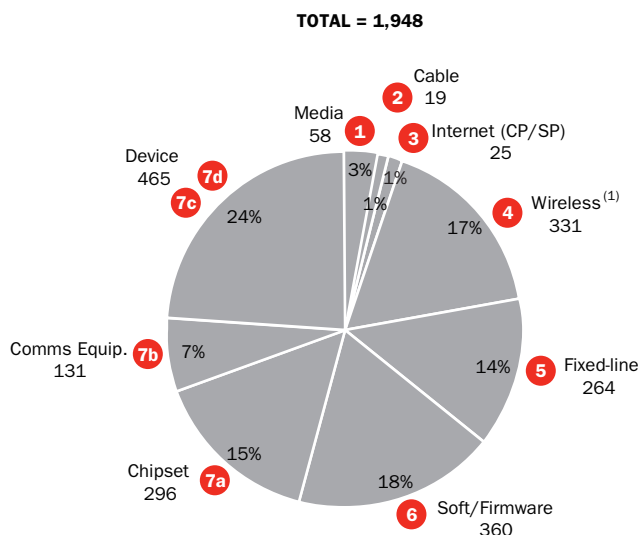
available, customers expect lower prices, better quality, and more involvement in product and service delivery. Moreover, there will be new forms of competition as barriers to entry across sectors are lowered. Competition will intensify, as even players that are light on assets are able to attack certain single links of the value chain.

This development will add pressure to many companies' underlying economics, as limited growth from core businesses creates pressure to enter new business segments, and new sources of value creation are necessary to compete profitably. At the same time, the value of communication infrastructure—access and transport—is shrinking as it becomes commoditized.

### Overall View of the Major Industry Sectors in the Convergence Space

A new Booz Allen Hamilton study has identified seven main sectors within China's telecommunications and information industries in the convergence space: media, cable, Internet, wireless, fixed-line, software, and hardware (with subsets of devices, communications equipment, and chipset within hardware), with total

**Exhibit 2**  
Cross-Industry Revenues (2005 Bn RMB)

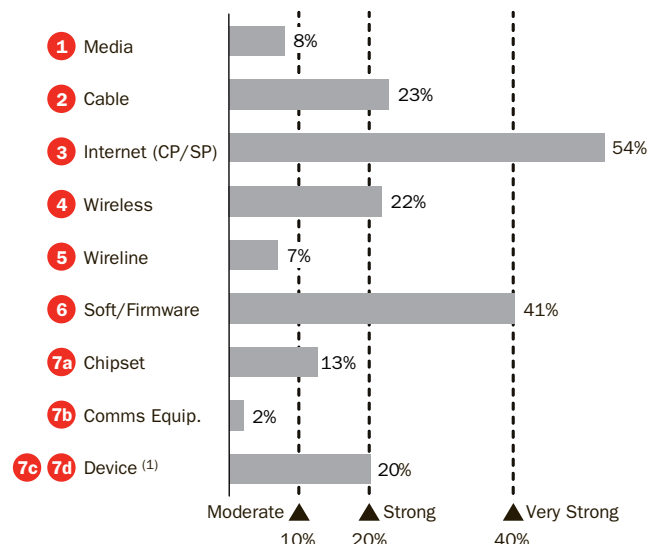


Note: (1) Satellite operator revenue has been integrated into that of Wireless  
Source: Wireless and Wireline – Yearbook of China Information Industry (Communication) 2006 and Company reports; Media and Cable Operator – Report on Development of China's Radio, Film and Television 2006; Internet – iResearch; Soft/Firmware – China Information Almanac 2006; Chipset – iSuppli; Comms Equipment, Device – China Electronic & Information Industry Statistics Yearbook 2005 and China Markets Yearbook 2006

annual revenue of 1,948 billion RMB (2005). The revenue is unevenly distributed: The top five sectors in terms of annual revenue are devices, software, wireless, chipset, and fixed-line—comprising more than 85 percent of total revenue (see Exhibit 2).

Sectors with the largest annual revenue are not necessarily the ones with the highest growth rate. The Internet sector has enjoyed the highest annual growth, followed by the software sector, the cable sector, and the wireless sector. On the other hand, the media, the fixed-line, and the communications equipment sectors have the lowest growth rates of 8 percent, 7 percent, and 2 percent respectively (see Exhibit 3).

**Exhibit 3**  
Cross-Industry Growth Profile (2004-2005)

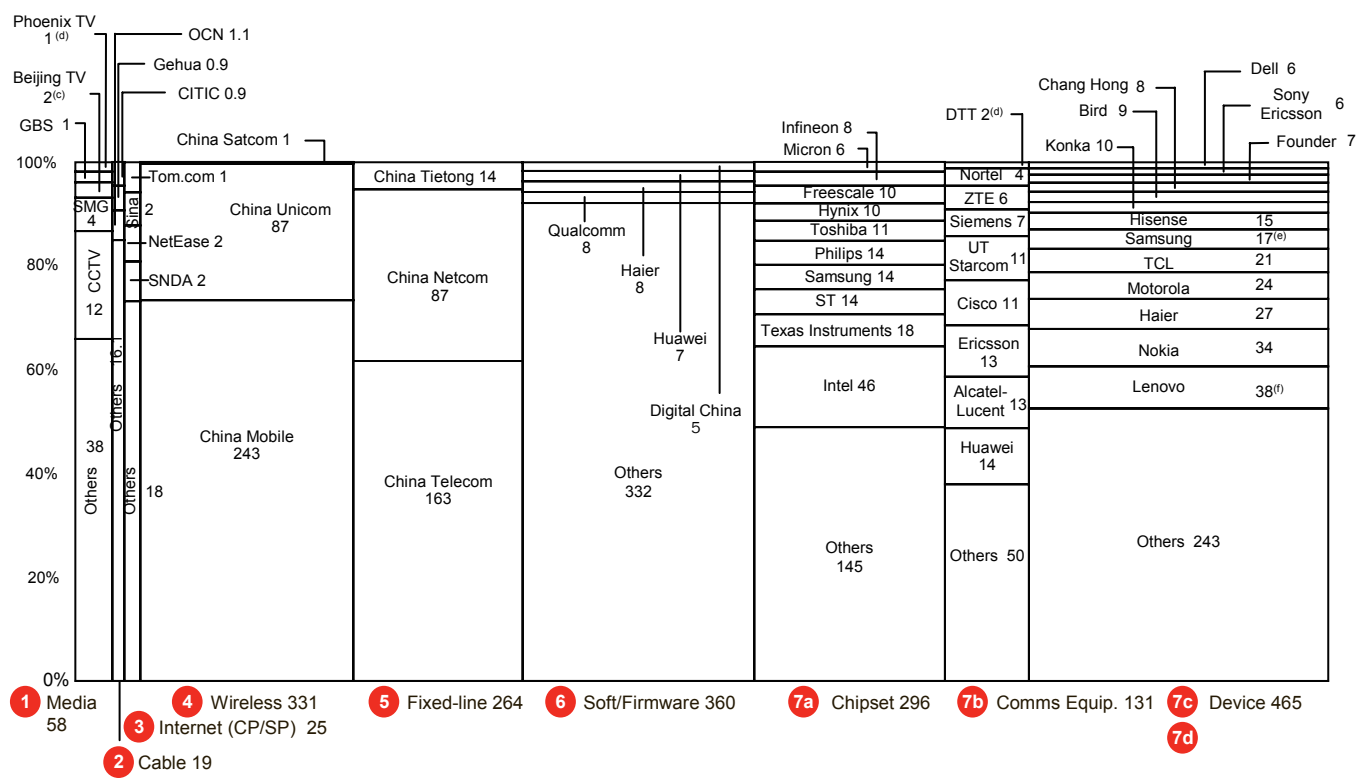


Note: (1) Growth rate for comms equipment and device is calculated on the base of total revenue (incl. export)  
Source: Wireless and Wireline – Yearbook of China Information Industry (Communication) 2006 and Company reports; Media and Cable Operator – Report on Development of China's Radio, Film and Television 2006; Internet – iResearch; Soft/Firmware – China Information Almanac 2006; Chipset – iSuppli; Comms Equipment, Device – China Electronic & Information Industry Statistics Yearbook 2005 and China Markets Yearbook 2006

The markets can be broadly divided into two types, depending on the degree of concentration (see Exhibit 4 on page 5):

- Oligopolistic market, dominated by a few established players: sectors that are highly regulated by the government (wireless and fixed-line), in which the major players are gigantic state-owned enterprises, are often oligopolies.

**Exhibit 4**  
**2005 Domestic Revenue – Major Players vs. Market** <sup>(a) (b)</sup>



Notes: (a) Revenue is changed from USD to RMB with the exchange rate USD 1= RMB 8  
 (b) Segment level revenues for some players have not been reallocated across all industries  
 (c) Based on advertisement revenue  
 (d) Based on the global revenue  
 (e) Based on handset market share of 2005  
 (f) Based on revenue in Greater China  
 Source: Company reports; Wanfang Consult; iSuppli; Booz Allen analysis

▪ Fragmented market, with many players: sectors with less governmental intervention, such as Internet, communication equipment, and device, in which competition between local and foreign players is keen, are generally fragmented.

In this dynamic arena, there are many large local or global players (e.g., telecom operators) with the power to shape the future convergence space, but smaller (e.g., cable) or emerging (e.g., Internet) players may also have the potential to change the game if they offer something special.

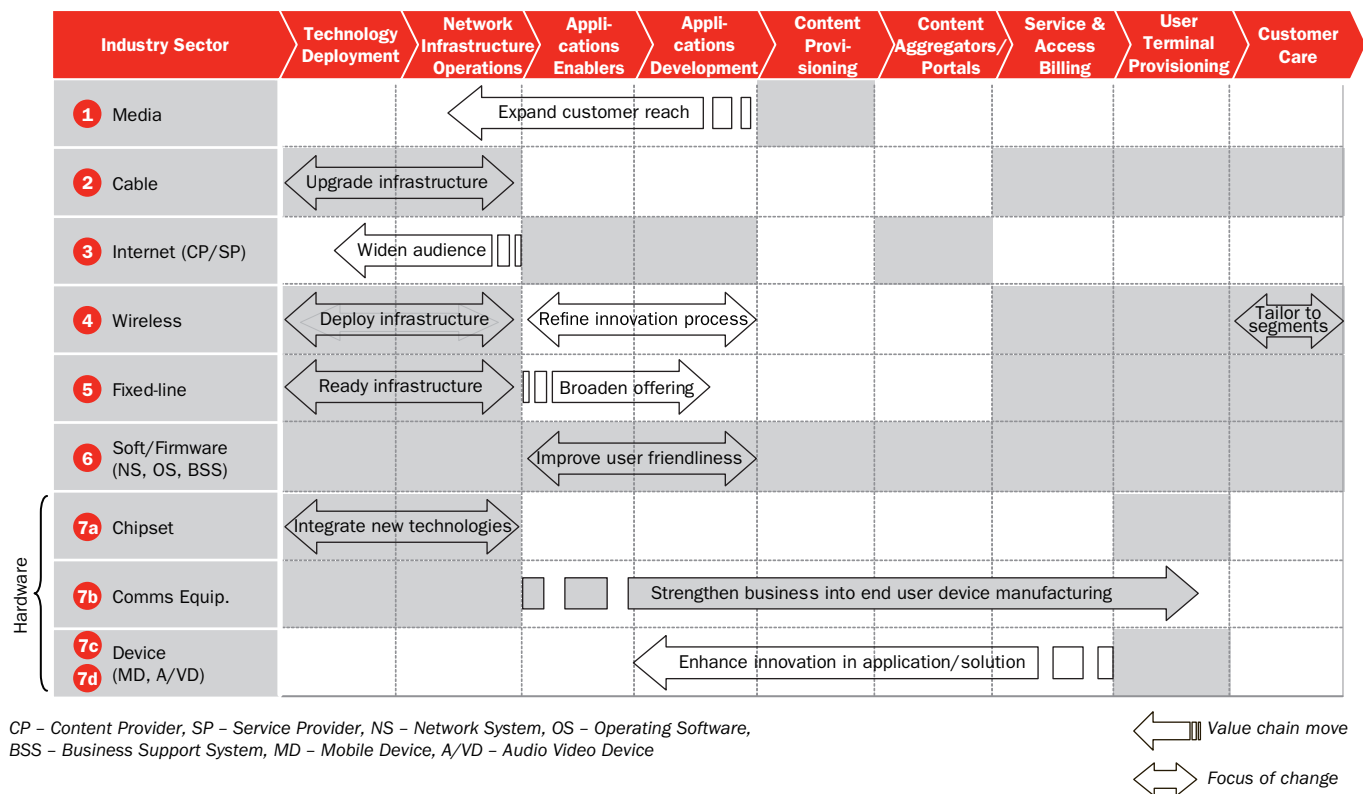
**Overall Impact of Convergence**

Convergence is opening up new opportunities and presenting new challenges to all players within the seven industries. It will be crucial for companies to upgrade their technology in order to catch up, such as getting

ready for third generation (3G) or for digital end-to-end cable distribution. But they also need to focus more on the changing demands of customers, which means companies will need to be flexible and able to respond quickly to changing needs. Although investment will be necessary, it will be more important for companies to have prompt insights and decisive actions that can help them become early movers and establish themselves as market leaders, which could involve developing new business models, building new brands, or finding the right partner before a competitor does.

Because the rules of the games are changing, companies will need to re-position themselves across the value chain to stay ahead, or just to survive. These changes require lateral thinking and will see companies enter new markets, which will replace old markets that are either shrinking or not seeing much growth. Some companies will even need to change their core products

## Exhibit 5 Value Chain Migration Map



Note: Darker color shading indicates stronger focus for a given industry sector  
Source: Company reports, Wanfang Consult, iSuppli, Booz Allen analysis

to stay ahead; for example, fixed-line companies will need to turn to wireless and data (see Exhibit 5).

The essence of convergence is synergy, which means that two or more players can contribute their strengths and combine with unique offerings from others, creating new services and products or building up differentiation. Some companies will be very much in demand as partners, such as Internet and software firms providing the interface that meets the consumers' eyes and media firms that provide the content. But behind all these are the technology and hardware companies that make everything possible in the first place and therefore constitute desirable partners (see Exhibit 6 on page 7).

### Characteristics of Each Sector

As convergence develops, companies in various sectors must devise specific plans and value-chain moves to meet the new challenges. The following

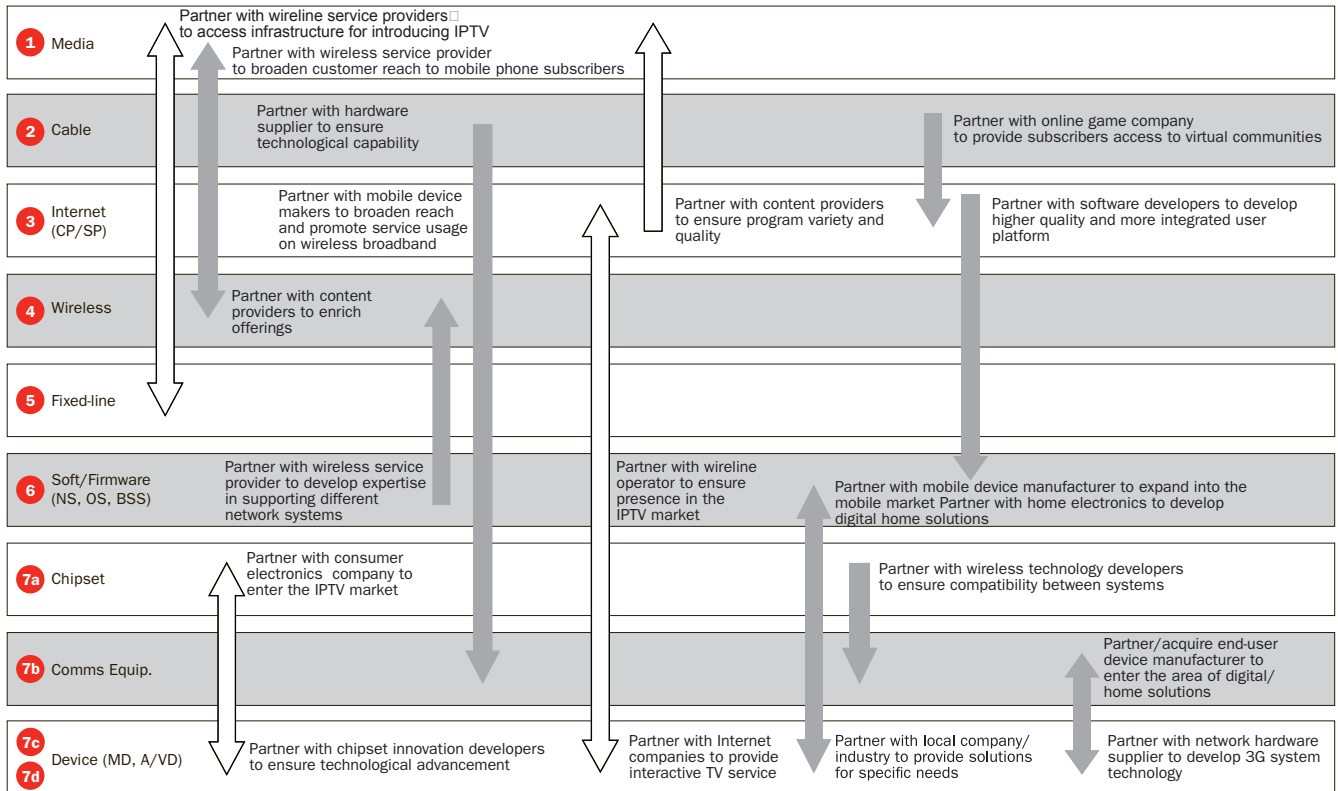
sections highlight some of the key issues and opportunities facing industry players in the convergence space in China.

#### 1. Media Providers

The total annual revenue of the media sector is 58 billion RMB (2005), with an annual growth rate of 8 percent. Central China Television (CCTV) leads the industry; with 16 channels and more than one billion viewers, it enjoys the distinction of being the world's most watched television network. It is the largest player in this sector with a 21 percent market share, followed by the Shanghai Media Group (SMG).

*Industry sector challenges.* As the current analog network is scheduled to be replaced in 2015, media providers will have to refine a digital network strategy to fulfil their Internet Protocol television (IPTV) ambition. But media providers are traditionally real-time content providers, and they do not have the infrastructure or

**Exhibit 6**  
Industry Sectors Partnership Map



CP – Content Provider, SP – Service Provider, NS – Network System, OS – Operating Software, BSS – Business Support System, MD – Mobile Device, A/VD – Audio Video Device



Note: Darker color shading indicates stronger focus for a given industry sector  
Source: Booz Allen analysis

technology to provide IPTV-like programs, which can offer more value-added services such as on-demand programs. For the future, players in the media sector will seek to provide more diversified high-quality, IP-based audio and video programs.

A characteristic of the sector is that the established players, especially CCTV, which is regarded as “the voice” for the Chinese government, face the most stringent scrutiny in terms of the kind of programs they can broadcast. That allows smaller TV channels opportunity to benefit and gain popularity because they can offer more creative and entertaining programs.

*Moving forward.* Media companies should diversify content and expand customer reach, either through new technology infrastructure or by partnering with fixed/mobile infrastructure players. Some players have teamed up with fixed-line service providers to access

infrastructure for introducing IPTV, such as SMG with China Netcom and China Telecom. Some have also partnered with wireless service providers, for example SMG with China Mobile, to broaden their customer reach to mobile phone subscribers.

**2. Cable**

Cable is the smallest sector within the convergence space, with annual revenue of 19 billion RMB and an annual growth rate of 23 percent. It has three big regional players and many small players; big players include OCN of Shanghai and Gehua of Beijing, and each has about 5 percent of the market. This sector, which is sometimes overlooked, actually attracts some big investors: CITIC has equity interest in cable networks in 18 cities, each at below 49 percent.

*Industry sector challenges.* Sustained growth will not come from traditional cable services, because the business model of cable companies is restricted by regulations, such as the lack of triple-play license. Their existing technology is another limitation: their infrastructure may not support future development and may require digital technology update, while expansion into broadband is difficult because that market is already 90 percent dominated by fixed-line companies. China has about 130 million cable users, driven by growth in major southern cities. The government subsidizes set-top boxes, which has propelled digital cable television penetration to 12 million, and the number is forecast to increase to 20 million by the end of 2007. Cable television users in Shenzhen, Guangdong, and Qingdao have been more receptive to digital service, while progress in Beijing and Shanghai has been slower. But the government is pushing for digital service for the 2008 Olympics—particularly in Beijing, where the city is targeting 1 million new digital customers out of its 3 million cable users by the end of 2007.

*Moving forward.* Cable TV companies may partner with hardware suppliers, as OCN did with Cisco, to ensure technological capability. Another option is teaming with online gaming companies, as OCN did with Ourgame, to offer subscribers access to virtual communities. To remain competitive, cable companies should build or enhance value-added services such as video-on-demand, music-on-demand, and news. They should also upgrade their infrastructure to satisfy the technical requirements for new services.

### **3. Internet**

Internet is the fastest-growing sector in the convergence space, with an annual expansion rate of 54 percent and a total annual revenue of 25 billion RMB. The Internet sector is broadly defined and includes traditional portals as well as new media players such as IPTV and content-sharing websites. The number of Internet users in China is expected to rise to 185 million by 2009, including 148 million broadband users and 13 million online game players. The compound annual growth for broadband users is expected to be 66 percent.

It is a sector with relatively low barriers to entry and which welcomes small players, but six heavyweights are fighting for leadership: Shanda (online games), Netease (portal), Sina (portal), Tom (portal), Tencent (IM), and Alibaba (e-commerce).

The new business of IPTV has seen UUsee and PPLive taking early leads. In the content-sharing sector, mop.com became very popular thanks to its diversified content, including photos, blogs, and videos.

#### *3a. Portal*

*Industry sector challenges.* With the number of search engine users expected to rise to 199 million by 2010, both local and foreign players are competing for market leadership in the portal sector.

But growth will be limited if they rely only on their current advertising-based business model and target mainly PC users. For the future, portals need to expand into new services such as IPTV and combine Internet portals with real-time and previously created content to leverage synergies.

*Moving forward.* Portals should expand into new media, content, and mobile Internet to generate new sources of revenue. Companies could team up with mobile device makers to broaden their reach and promote service usage on wireless broadband, as in Samsung's Google phone and Motorola RAZR's Yahoo! application. Some have already started to move into this direction by acquiring content providers, for example, Sina's purchase of Sun TV.

#### *3b. IPTV*

*Industry sector challenges.* IPTV has the unique potential of providing fast and high-quality entertainment with more channels, music, and other value-added services—for example, Vodone's video-sharing community. However, the quality of services delivered is determined by the quality of the broadband connection, so pictures are often of lower quality than those on traditional television.

Some players are partnering with satellite operators to improve broadcast quality, as Vodone did with Satcom, while others team up with content providers to ensure program variety and quality, such as PPLive with Zoke Culture and netfilm.cn.

Global players such as Joost are putting a lot of emphasis on the technical readiness of their solutions, conducting long periods of beta testing, and are polishing up their user interface. This business model has seduced key investors who have signed-off on their second round of financing.

*Moving forward.* IPTV players need to evolve their business models in order to generate advertising revenue; they should explore new revenue sources, such as subscription fees or pay-per-view models. They may also differentiate themselves from competitors by providing richer content and improving picture quality.

### 3c. Content Sharing

*Industry sector challenges.* Content sharing, in formats similar to YouTube, is a fragmented market, containing multiple players with similar products (e.g., mop.com, 56.com). Culture creation and branding are critical for attracting and maintaining subscribers, making continuous innovation a necessity. Because the market is essentially made up of free products, companies need to consider ways to generate revenue. In addition, issues on content piracy have emerged and led to lawsuits and will require special attention. Basically, companies need to become trendsetters to win market share, and they will need to increase capital investment in the digital media platform to prepare for expansion in the broadband Internet and wireless value-added service market.

*Moving forward.* Content-sharing firms need to differentiate themselves from competitors by innovation, clear market positioning, and branding. Some content-sharing companies are teaming up with content providers to bring diversified content to their community (e.g., mop.com with CCTV and online game company WOWAR.com) or with software developers to develop integrated user platforms (e.g. UUme and mop.com with developer Koboo).

## 4. Wireless

The wireless sector is an oligopoly, with China Mobile commanding 73 percent market share versus China Unicom's 26 percent. This sector has 17 percent of the revenue within the convergence space at 331 billion RMB, and an annual growth rate of 22 percent. Wireless users are expected to reach 560 million in

2008, and China Mobile's position has been further strengthened in recent years as it has expanded to China's vast rural areas.

*Industry sector challenges.* Wireless operators are facing several challenges: Average revenue per user (ARPU) for basic wireless voice is decreasing, especially with one-way billing and the increasing number of rural customers with lower income; investment in the 3G market is delayed due to an uncertain launch date; and competition from personal handyphone system (PHS) operators, which may get 3G licenses, is on the horizon. New Internet business models may also disrupt the business structure of the wireless market. Satellite business, meanwhile, is limited to the business-to-business sector.

To boost growth, mobile operators are seeking partnerships to provide tailored value-added services—such as China Unicom's partnership with banks to provide mobile phone banking—and deals with content providers to enrich offerings, as China Mobile has done with CCTV and NBA Sports News.

*Moving forward.* Wireless operators need to revisit their business model, given the imminent 3G launch, and ensure a smooth migration from second generation (2G) to 3G, by building the necessary infrastructure. They also need to refine their innovation process to cater to different market segments. Finally, they need to increase ARPU for existing customers by establishing more targeted services for specific segments and introduce more value-added services.

## 5. Fixed-Line Telecom

With a relatively low annual growth rate of 7 percent, the fixed line sector is also an oligopoly: China Telecom enjoys a dominant 62 percent market share over China Netcom's 33 percent. The third player, China Tietong, has 5 percent. The total annual revenue of the fixed-line sector is 264 billion RMB, making up 14 percent of the convergence space. Growth is coming mainly from rural areas where penetration is low, and investment requirements are more significant than in the wireless sector.

*Industry sector challenges.* Fixed-line players, especially China Telecom, have for years been keen to move into the wireless space to gain growth momentum. The firm

is determined to get a 3G license. Its current offering, Xiaolingtong—a limited-range, inexpensive wireless voice service—is predicted to be forced out once 3G is launched, as prices for 2G calls will be cut. New demand for fixed-line voice services is low, because customers are migrating to wireless services, a trend potentially accelerated by the implementation of one-way billing for mobile calls in some provinces, regions, and municipalities.

The sector is facing many challenges, including disruption by new Internet business models. Companies will need to change their business models and offer triple-play services. To maintain growth, companies are teaming up with media providers to enter the IPTV market, as China Netcom has done with CCTV and China Telecom with SMG; they are also partnering with technology developers to reduce royalties, as China Netcom has done with the developers of AVS technology.

*Moving forward.* Fixed line operators should broaden product offerings to compete as triple-play integrated service providers, offering Internet, IPTV, and 3G if a license is granted, and develop broadband Internet services for home and on-the-go. They should also develop the technology and infrastructure for the delivery of future IP-based services.

## 6. Software/Firmware

Broadly defined, the software/firmware sector covers network systems, operating systems, and clients, as well as back-office support software. It therefore includes multinational giants Microsoft and Oracle and Chinese heavyweight Haier, among others. This sector as a whole generates total annual revenue of 360 billion RMB, making up 18 percent of the convergence space. With an impressive annual growth rate of 41 percent, the sector is nonetheless highly fragmented, with domestic companies playing an increasingly important role. Overall, the growth of services is faster than that of products.

### 6a. Network Systems

*Industry sector challenges.* For network system software players, the imperative is to revisit their technology strategy in light of the IP-driven convergence. The

expected transition from 2G and PHS to 3G has led to a decrease in PHS and Code Division Multiple Access (CDMA) investments from mobile operators, trimming market growth and profit margins. Major uncertainties in this field include the 3G launch time and the 3G network standard, as well as the withdrawal of government subsidies to local players.

Companies are now partnering with wireless service providers to develop expertise in supporting different network systems, as Qualcomm has done with China Unicom on CDMA and Global System for Mobile Communications (GSM) systems, and with fixed-line operators to ensure their presence in the IPTV market, for instance, UTStarcom with China Telecom.

*Moving forward.* Network system players will need to define their technology strategy clearly and provide innovative solutions for digital wireless communication products and services to help companies in their expansion into new businesses that support all IP-based multimedia functionalities.

### 6b. Operating Systems/Clients

*Industry sector challenges.* Software companies that sell operating systems should focus on innovation to develop attractive platforms for the integrated device market and differentiate their businesses from competitors. They should also seek to improve the end user experience by simplifying the user interface to increase competitiveness in the mobile device market.

Companies should also develop wireless solutions to expedite development in the home and auto digital markets. Some have teamed up with a mobile device manufacturer to expand into the mobile market—for instance, Microsoft with TCL and Dopod—or formed partnerships with home electronics manufacturers to develop digital home solutions, as Microsoft has done with Haier.

Piracy is still an area of concern. Despite active measures from the government to enforce intellectual property rights, piracy issues remain the main source of revenue leakage in this industry. Recent press reports stated that about 40 percent of all software used in China consists of illegal copies.

*Moving forward.* Companies should step up innovation and develop applications for the converged market and differentiate from competitors by improving the end user's experience and supporting the widest range of technologies both fixed and wireless.

#### *6c. Back Office Support*

*Industry sector challenges.* Companies in this space include multinational giants such as Oracle and SAP. They need to anticipate the evolving requirements from converged fixed and mobile network customers (e.g., customer database synchronization) and create solutions for their clients. Software solutions should remain scalable and become increasingly independent from the profile of the operator, either fixed or mobile.

Back office players should develop solutions for telecom companies in response to their drive towards convergence. They should also devise solutions to support corporations in perfecting their processes and improving their customer relationships.

*Moving forward.* Back office support software players need to tailor their offerings for the specific needs of the industry sectors in the convergence space. Some have teamed up with other software companies in joint-technology initiatives, as Oracle has done with EMC China by building up a technology center; others have partnered with local IT companies to tailor customer service in China, such as SAP with Neusoft.

### **7. Hardware**

The hardware sector is also broadly defined, covering the chipset, communications equipment, and device manufacturing industries.

#### *7a. Chipset*

China's chipset market is the second largest in the world, after the United States. The chipset industry makes up 15 percent of the convergence space with revenue of 296 billion RMB and a growth rate of 13 percent. Led by Intel with approximately 15 percent market share, the sector is dominated by international brands such as Texas Instruments and Samsung.

*Industry sector challenges.* Uncertainties over the launch time of the 3G network in China have slowed the development of the chipset market, slowing down the

fixed-mobile convergence and the emergence of mobile media applications. Nonetheless, chipset companies need to continue their innovations in digital home solutions, fixed-mobile convergence, and mobile TV by further developing integrated processors. They must also identify industry segments, such as hospitals, that will benefit from the usage of chipsets enabling mobile wireless and providing digital solutions.

*Moving forward.* Companies should strive for continued innovations in wireless chip technologies for 3G applications and home digital solutions. Some have teamed up with consumer electronics companies, such as Texas Instruments with Konka, to enter the IPTV market, while others are partnering with wireless technology developers, like Intel with Buffalo and D-Link, to ensure compatibility between systems.

#### *7b. Communications Equipment*

The total annual revenue of the communications equipment sector is 131 billion RMB, with an annual growth rate of 2 percent—the lowest among the industries within the convergence space. It is also a sector dominated by multinational giants: Cisco, Siemens, and Ericsson, to name a few. But standing shoulder-to-shoulder with them are companies such as Huawei, which is foremost among a growing number of domestic players.

*Industry sector challenges.* The entire sector is suffering because of the drop in investment for voice hardware systems. Therefore, companies should focus on the expected increase in investments for Voice over Internet Protocol (VoIP), IPTV, and NGN/IMS. Some domestic companies are teaming up with international players, as is Huawei with IBM, to expand into the international market. Furthermore, the forthcoming investment in 3G infrastructure in China is likely to boost revenue for the players that have bet on the right technologies: Time Division-Synchronous CDMA (TD-SCDMA), Wideband (W)-CDMA or CDMA 2000.

*Moving forward.* Communications equipment companies should embrace the goal of seamless voice, data, and video delivery anytime and anywhere by supporting fixed and wireless broadband technologies. Companies should also develop innovations to support high-quality IPTV and introduce value-added services.

They should nurture innovation technology and enhance product capabilities to capture the potential of IPTV/NGN. They could also seek to enter into end user device manufacturing, as Cisco has done via its acquisition of Linksys.

#### *7c and 7d. Device Manufacturing (Mobile and Audio/Video)*

The total annual revenue of the device manufacturing sector is 465 billion RMB, making it the largest among the convergence industries. With an annual growth rate of 20 percent, it is an attractive market for ambitious companies large and small.

#### *Mobile Devices*

The mobile device market is dominated by international giants such as Nokia and Samsung, but domestic companies are catching up—they currently have 33 percent of the market. Shenzhen alone has more than 500 companies making mobile phones and phone-related products.

*Industry sector challenges.* Support for new technologies is paramount to ensure competitiveness in areas such as multimode devices. The ability to tailor products to specific needs, such as applications for a specific community, is essential to capturing the high-end market. Device makers should develop technologies to provide integrated solutions for business and entertainment on-the-go, such as media players, mini-computers, phones, and mini-TVs.

Some device makers are teaming up with local companies, as Nokia has with Cgogo, and with targeted organizations, as Dopod has with banks and government institutions, to provide solutions for specific segment needs. Others are partnering with hardware suppliers to develop 3G system technology, for example, Nokia with Nanjing Putian Telecommunications.

*Moving forward.* Mobile device manufacturers should step up their drive for innovation to produce integrated personal and business devices for the future 3G market. They should differentiate and position themselves as tailored solution developers for specific industry segments.

#### *Audio/Video Devices*

*Industry sector challenges.* Market competition is keen and profit margins in audio/video devices are very thin. Sporadic attempts by certain companies to expand overseas by acquiring foreign firms have found little success, because management lacked knowledge of the overseas market and the necessary experiences to manage international teams. The technological innovation quality of domestic firms is still lagging behind their more established multinational competitors, and the premature entries into new product lines (such as mobile phones and PCs) have led to profit losses for many local companies.

The key challenge for Chinese audio/video device makers is to maintain or grow market share at home and seek expansion internationally. To succeed, they must continue technology research and development to ensure competitiveness and refocus on their core home electronics business, while further developing products for home digital solutions. In parallel, they need to expand their management skills with international experience so they can pursue foreign expansion.

*Moving forward.* Audio/video device manufacturers should refocus on their profitable core businesses and create products for convergence developments by ensuring compatibility with those technologies that will enable them to play a pivotal role in the Chinese digital home market. They must therefore strengthen innovation processes to create differentiation and sustain competitiveness.

Some companies have teamed up with innovation developers to ensure technological advancement: TCL with the Chinese Academy of Sciences, for instance, and Haier with Intel. They have also partnered with Internet Content Providers/Service Providers (CP/SP) to offer interactive TV service, as TCL has done with Tencent.com.

#### **Anticipating the Change**

Convergence is already materializing. Though it is a multimedia, multi-technology, multi-market challenge, it will bring many new business benefits. Boundaries of different industries will blur, and there will be broader markets for products that traditionally belonged to one sector only.

Some companies are already converging their telecom, television, Internet, and mobile businesses to create synergy. Hong Kong's PCCW, once a traditional telephone company, has aggressively turned to Internet and broadband since the 1990s to seek transformation; it then used that platform to expand into other businesses area, such as broadband TV. PCCW is now leveraging some popular content from television (e.g., English football) to provide exclusive content for its mobile phone service as a way of boosting its wireless business.

There is no doubt that China is on the threshold of the convergence age, and the government is joining industry to embrace the trend and create the infrastructure. Case in point: In the "wireless Shanghai" program, Shanghai Telecom is investing 4 billion RMB to upgrade the city's wireless and broadband services, and so far has established more than 2,000 wireless access points in public areas and Wi-Fi services in more than 100 office buildings and hotels.

No matter which sector a company may belong to in the wider telecommunications and information industry, convergence will inevitably impact its business, and major transformations are looming on the horizon. Players in the convergence space need to ask themselves which role they ultimately want to play, what convergence means for their organization, what impact convergence will have on their products or services portfolio, and how the competitive landscape is going to change.

Convergence will present challenges and opportunities for companies to maximize their business potential from the fast-changing telecom, information and media sectors. But early mover advantage is important, so companies must act decisively if they wish to lead and shape the convergence trend, instead of trailing behind and forever trying to catch up.

---

## BOOZ & COMPANY WORLDWIDE OFFICES

### Asia

Beijing  
Hong Kong  
Mumbai  
Seoul  
Shanghai  
Taipei  
Tokyo

### Australia, New Zealand, and Southeast Asia

Adelaide  
Auckland  
Bangkok  
Brisbane  
Canberra  
Jakarta  
Kuala Lumpur  
Melbourne  
Sydney

### Europe

Amsterdam  
Berlin  
Copenhagen  
Dublin  
Düsseldorf  
Frankfurt  
Helsinki  
London  
Madrid  
Milan  
Moscow  
Munich  
Oslo  
Paris  
Rome  
Stockholm  
Stuttgart  
Vienna  
Warsaw  
Zurich

### Middle East

Abu Dhabi  
Beirut  
Cairo  
Dubai  
Riyadh

### North America

Atlanta  
Chicago  
Cleveland  
Dallas  
Detroit  
Florham Park  
Houston  
Los Angeles  
McLean  
Mexico City  
New York City  
Parsippany  
San Francisco

### South America

Buenos Aires  
Rio de Janeiro  
Santiago  
São Paulo