

Multimedia Phones in China: What is the Next Selling Point?

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Executive Summary

Multimedia handsets are the result of mobile phone makers' efforts to change cell phones into personal communications and entertainment centers.

China's multimedia phone market experienced great development in 2006 in terms of ample supplies of available models and total shipments. The drivers come from both the supply and demand side.

From the supply side, improvements in semiconductor solutions contributed a lot to the growth of the multimedia phone market. As an example, Taiwan-based MediaTek integrates multimedia functions into its baseband processors, thereby allowing handset makers to add music and video playback functions into feature phones without extra cost, which has resulted in a lot of affordable mid-tier multimedia phones being available on the market.

From the demand side, the music playback function was a significant driver to the growth of the multimedia phone market in 2006. Especially, Chinese consumers can download pirated music available on the Internet to the PC and then upload the music from a PC to their handsets, which has driven the proliferation of the music phone in China.

In-Stat estimates that multimedia phone shipments in China reached 44.2 million in 2006, accounting for 34.0% in total handset shipments of 2006.

There are some important trends in the development of the multimedia phone market. Firstly, as multimedia functions have become the most important differentiating factor for handsets, phone makers will continue to strengthen handsets' multimedia functions, especially in terms of camera and video. In-Stat's latest survey shows that the ability to take pictures is an under served function for phone users, which suggests that there is still quite a bit of room for improvements. As phone makers are integrating high-level digital still camera functions into high pixel camera phones, we feel that professional camera functionality will be the next focus of competition in the high-end market. Meanwhile, to improve video performance, phone makers are designing multimedia phones with bigger display screens. Phone makers are also trying to improve mobile phones' video processing capacities in terms of resolution and frames per second (fps).

Secondly, to create powerful multimedia functions, handset manufacturers are building multimedia phones based on smartphone platforms which generally are equipped with an operating system (OS)

HIGHLIGHTS

- Multimedia phone shipments in China reached 44.2 million in 2006, representing a penetration rate of 34.0%. It is expected to reach 165.0 million in 2011 with a penetration rate of 81.0%.
- Multimedia phones are evolving to be the personal communication, entertainment and business center.
- High pixel camera phones will be the next competitive focus in the multimedia phone market.
- The combination between mobile phones and the web 2.0 network will be an important driver for the multimedia phone market in the future.

and a powerful processor. We expect that the combination of multimedia phone and smartphone functionality will enable the resulting product to be the personal communications, entertainment, and business center.

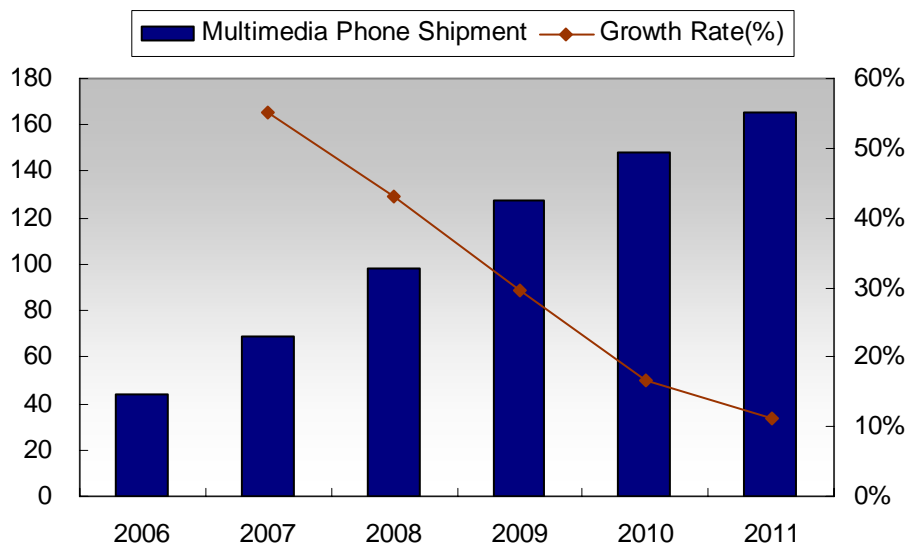
Looking to the future, drivers for the multimedia phone market come from content availability, continuous improvements in semiconductor solutions, higher data rate wireless technologies, and a combination of the mobile phone and web 2.0 networks. Moreover, multimedia phones will also benefit from the broadcast mobile TV services that are expected to be available in 2008, the year of the Beijing Olympics.

However, there are also some barriers for multimedia phones. As multimedia phones have integrated power-consuming audio and video playback functions, bigger display screens, and more wireless technologies, the competing priorities between power consumption and battery life is becoming more and more prominent.

In addition, the Chinese government's constraints on Wi-Fi enabled handsets will cast a shadow on prospects for multimedia phones. Due to the pending WAPI standard and concerns with VoIP, the sale of cell phones with Wi-Fi functionality has been banned in China by the Ministry of Information Industry. The lack of Wi-Fi functionality will deprive mobile users of high-speed Internet access, which has a negative effect on the development of the multimedia phone market.

Considering both drivers and barriers to this market, In-Stat expects that multimedia phone shipments in China will reach 165.0 million in 2011, accounting for 81.0% in the forecasted total handset shipments in 2011.

Figure 1. Multimedia Phone Shipment Forecast 2006–2011 (Units in Millions)



Source: In-Stat, 04/07

As the competitive focus for the mobile phone market shifts to multimedia capabilities, those handset manufacturers who are also involved in multimedia devices and digital still cameras will have an advantage over other manufacturers in terms of technology integration. Sony Ericsson has leveraged

such advantages provided by its parent company Sony to become a leader in the multimedia phone market. Samsung likewise has a leg up in the competition environment for multimedia phones. Other handset makers need to strengthen their technologies in the multimedia sector. Nokia has exhibited a rapid response to these competitive pressures by introducing its N series of multimedia phones, which have kept the company on the leaderboard in this area. Motorola seems to be in most need of strengthening its multimedia phone offerings, especially in high-end products.

For most of the domestic Chinese phone makers who are competing intensively in mid-tier market, the biggest problem facing them is how to differentiate their products from that of their competitors.

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Introduction

Multimedia phones are a result of handset industry's continuous efforts to integrate multiple devices into one. The initial foray into integration was the addition of digital camera functionality which was integrated into mobile phones in 2001. This was followed by digital music players and video players.

Besides the primary communication capability, multimedia phones are capable of playing audio, video, in addition to featuring imaging functions. On the software side, compared with basic phones, multimedia phones generally provide users with a music player and a video player, or an integrated media player. In terms of hardware, multimedia phones are always optimized for music and video playback in terms of storage capacity, buttons, display, output, etc.

It should be noted that our definition does not exclude smartphones. In fact, handset manufacturers are very focused on enhancing the multimedia functions of smartphones, highlighting multimedia as another important selling point for smartphones, following productivity. For this reason, our statistic data of multimedia phones includes that portion of smartphones that have integrated music, camera, and video playback functions.

Multimedia phones have evolved in two phases. In its infancy, market offerings were limited mostly to models that were basic phones that simply integrated music and video functions, but didn't go a long way in performance terms to enhance the user experience. More recently, to meet consumers' enthusiastic demand for multimedia functionality, handset manufacturers have introduced advanced multimedia phones with enhanced capabilities, especially in terms of digital music and imaging.

Table 1 shows the difference between basic and advanced multimedia phones in terms of music, camera, video, connectivity, and storage features.

Table 1. Basic and Advanced Multimedia Phone Configurations Overview

	Basic Multimedia Phone	Advanced Multimedia Phone
Music	Supports MP3, WMA, AAC, etc.	Supports MP3, WMA, AAC, RealAudio, etc.
	FM/AM Stereo Radio	FM/AM Stereo Radio
		Optimized buttons for music playback
		Supports professional peripherals for music playback, for example, a 3.5mm stereo headset with line-control function or a high quality speaker
Camera	1.3–2.0 megapixel CMOS Camera	2.0–5.0 megapixel CMOS/CCD Camera
	Auto-Focus	Flash Lamp or Xenon Flash Lamp
	4x Digital Zoom	Optical Zoom Lens
		Supports Auto-Focus, 3x Optical Zoom, up to 20x Digital Zoom
Video	Supports MPEG-4 and 3GPP video files	Supports MPEG-4, H.264, H.263/3GPP, RealVideo 8/9/10, ASF, WMV
	QVGA or QCIF 15fps	QVGA or QCIF 30fps
	Supports video recording at QVGA or QCIF 15fps	Supports video recording at VGA 30fps
Wireless	IrDA, Bluetooth 1.1/1.2/2.0	IrDA, Bluetooth 2.0, Wi-Fi
Wireline	USB 1.1/2.0	High-Speed USB 2.0
		TV-OUT
Storage	Supports up to 2GB Removable Memory Card	Built in 4GB or 8GB Storage Capacity
		Supports up to 2GB Removable Memory Card

Source: In-Stat, 04/07

Market Overview

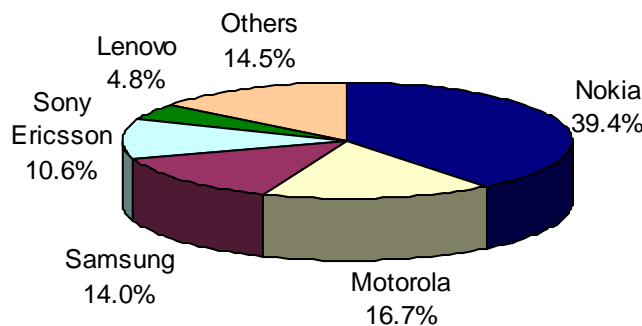
China's multimedia phone market experienced strong growth in 2006. Thanks to improvements in terms of hardware platforms, handset manufacturers have been able to add music and video playback functions into mid-tier feature phones without incurring extra cost. Due to this, most of the mid-tier models introduced in 2006 were priced at about US\$200 and were pretty basic. On the other hand, more than half of handset buyers in 2006 are replacing users who are more interested in enhanced entertainment functions. This promoted the development of the advanced multimedia phone market. With these two factors combined, In-Stat estimates that multimedia phone shipments hit 44.2 million in 2006, accounting for 34.0% of total handset shipments in China.

Notably, it was the music playback function that contributed most to the growth of the multimedia phone market in 2006. Chinese consumers can download pirated music available on the Internet to their PCs and then upload them from their PCs to handsets, which drives the proliferation of music-enabled multimedia phones in China. (For more information, see the report *Music Phone Wins but Mobile Music Loses in China* (#IN0703878CWW).

In 2006, Nokia led the multimedia phone market in China, largely driven by the success of its N series handsets. In-Stat estimates that Nokia accounted for almost 40% market share in the multimedia phone market. Sony Ericsson was another winner in 2006 with its introduction of the Walkman series of music phones and the Cyber-shot series of camera phones. Though Sony Ericsson's strategy is focused on the high-end of the market, which limited its total shipments, the company accounted for a 10.6% market share in the multimedia phone market.

Motorola and Samsung kept their positions in multimedia phone market and Lenovo accounted for a 4.8% market share. Lenovo has the potential to increase its market share in 2007 by strengthening its marketing message.

Figure 2. Multimedia Phone Vendors' Unit Shipment Market Shares in 2006



Source: In-Stat, 04/07

Total=44.2 Million

Feature Development Trends

By integrating music, video, imaging, and gaming functions, handset manufacturers have tried to position multimedia phones as personal communications and entertainment hubs. Looking to the future, we see some important trends in the development of multimedia phones in China as follows:

1. The convergence between the multimedia phone and the smartphone. To create powerful multimedia functions, handset manufacturers are building multimedia phones based on smartphone platforms which generally are equipped with an operating system (OS) and a powerful processor. Nokia is a typical case, with its N series phones all based on the Symbian OS and Nokia's S60 platform. Amoi, a pioneer in the delivery of low-cost smartphones, has introduced many mid-tier multimedia phones based on a smartphone platform. This trend is followed by Sony Ericsson and Samsung. Sony Ericsson's W958 Walkman handset is based on Symbian OS 9.0 and the UIQ 3.0 platform, which allows the device to open and edit Microsoft Word and Excel documents. Samsung i718, introduced at the end of 2006, is a powerful multimedia phone based on Windows Mobile OS. We expect that the combination of features from multimedia phones and smartphones will enable its application as a personal communications, entertainment, and business hub.
2. Professional functions have become the most important differentiating factor for multimedia handsets. Phone makers will continue to strengthen handsets' multimedia functions, especially in terms of taking pictures and video. In-Stat's latest survey shows that camera functionality is an under-served function for phone users, which suggests that there is still quite a bit of room for improvements. As phone makers are integrating high-level functions in digital still photography to high pixel camera phones, we see that professional level camera functions will be the next competitive focus in the high-end market. On the other hand, to improve video performance, phone makers are designing multimedia phones with bigger display screens. And phone makers are also trying to improve video processing capacities in terms of resolution and frames per second (fps).
3. Connectivity is also becoming more important for the multimedia phone market. Mobile multimedia users need access to content such as music and video from the external world via salient means of connectivity. Mobile users also need to share the content they have created on their own mobile phones with their external network through various means of connectivity. So, phone makers will continue to enhance mobile phone connectivity by adding USB, TV-OUT, Wi-Fi and WiMAX technologies to their handsets.
4. Phone makers are also incorporating other functionality into the multimedia phone, like GPS. GPS-enabled handsets can provide location-based services to mobile users. Nokia will introduce its first GPS-enabled model N95 in China in 2Q07, and Motorola plans to announce a GPS-enabled model in 3Q07 in China. This trend will be followed by other phone vendors in 2007.

Music Playback

In response to the unprecedented success of MP3 players, mobile phone manufacturers began to add music playback capability to handsets from the end of 2004. Since then, MP3-enabled mobile phones are referred to as music phones in China.

The music phone is embraced by Chinese consumers as it combines an MP3 player and allows users to set his or her favorite songs as ring tones. With the proliferation of the music phone, music has become the leading function on a multimedia phone in this market.

Mobile phone manufacturers have continued to improve music playback functionality, making music phones comparable with standalone music players in terms of audio quality, storage capacity, ease-of-use, and functionality.

The dedicated music phone came to market when Sony Ericsson announced its first Walkman music phone, the W800, during the second half of 2005. The dedicated music phone was optimized for music playback in terms of buttons, software, DRM and so on. Many Chinese call dedicated music phones “professional music phones.”

There are five properties of the professional music phone:

1. High storage capacity. Generally, professional music phones come equipped with 1GB or more Flash memory to store music files and may support external memory cards like MultiMedia Card (MMC) or Compact Flash (CF).
2. Optimized buttons for music playback. Professional music phone manufacturers make an effort to have the layout design of the handset buttons be similar to a music player. For example, some music phones feature a dedicated music button to enable one-click playback in addition to providing play, pause, forward, backward, and stop functions for music playback on their keypads.
3. Professional music player software. The music player embedded in a professional music phone can provide file categorization and management functions, and enable file synchronization with a PC.
4. Supporting professional peripherals for music playback, for instance, a 3.5mm stereo headset with line-control function or a high quality speaker.
5. Digital rights management. Professional music phones contain embedded DRM solutions to protect music copyrights like portable music players.

It is expected that handset manufacturers will continue to enhance music playback functions and strengthen their music phone offerings. Much activity has been stimulated by the introduction of Apple's iPhone.

Camera

Since Sharp announced the J-SH04, the first 0.1Mega Pixel (MP) camera phone in September of 2004, camera functionality has almost become a standard function of handsets. Camera functionality and quality in handsets has evolved from 0.1Megapixel and 0.3Megapixel to 1.3Megapixel, 2Megapixels, 3Megapixels, 5Megapixels, and even 10Megapixels. Although the camera functionality was integrated

into handsets much earlier and has a higher penetration rate than music playing, In-Stat's latest survey shows that customers are less satisfied with camera functions in handsets than in music playing (refer to In-Stat report #IN0703900CWW, *In-Sights: Chinese Users Warmly Embrace Multimedia Phones*). The key reason is that the technologies that support high-quality imaging are much more complicated than those that support music playback. It is hard to integrate many key technologies that are crucial to imaging quality into handsets, such as zoom lens and flash lamps. Therefore, camera phones are still far from comparable to digital still cameras. On the one hand, this suggests that there is still quite a bit of room for handset manufacturers to improve camera function on their handsets. On the other hand, it also provides opportunities for handset manufacturers to differentiate their products.

In 2006, Sony Ericsson and Nokia successfully differentiated their high-end products by enhancing camera functionality. Sony Ericsson's cyber-shot series of camera phones have a built in 3.2 MP CMOS camera and are equipped with a Xenon flash lamp, typically used in digital still cameras. The cyber-shot series of camera handsets support auto-focus and 16X digital zoom. They also support BestPic, which is a special feature in high-end digital cameras.

High-end camera phones from Nokia, such as the N73 and N93, have a 3MP CMOS camera inside. A key selling point is their lens which is authorized by Carl Zeiss and can support 3X optical zoom. Carl Zeiss is a famous German optics lens manufacturer with a history of 150 years. Carl Zeiss optics lenses are regarded as one of the best and are widely used in digital still cameras. High-end camera phones from Nokia also have flash lamps inside and can support up to 20X digital zoom.

As camera function becomes an essential factor to differentiate products, In-Stat believes that handset manufacturers will increasingly enhance the camera function. 3MP will turn out to be a watershed. This is because functionality with 3MPs approaches the pixels and hence quality of entry-level digital cameras and will satisfy customers more sufficiently. This in return will stimulate customers' demands on camera phones. Hence, 3MP camera phones will be the focus of market competition in the near future.

With the increasing pixels in camera phones, the function of video recording is getting more and more important. At present, most multimedia handsets support video recording utilizing QCIF or QVGA at 15 fps, but only high-end Nokia handsets can support video recording utilizing QVGA (640x480) at 30 fps, which we estimate will become the main trend in the future.

We believe that in the competition of camera phones, handset manufacturers which have key technologies of digital still cameras will gain superiority, such as Sony Ericsson and Samsung. Other handset manufacturers need to enhance their camera technologies to retain a competitive advantage in the market. Compared with other manufacturers, Nokia has gained superiority early.

High-end camera phones launched in China by Samsung feature a maximum of 3MPs, with flash lamps inside, supporting auto-focus and 4X digital zoom. Judging from the perspective of camera function, Samsung doesn't have any advantage over Sony Ericsson and Nokia. But Samsung is always the leader in the realm of camera phone with high pixels. Early in October of 2004, Samsung announced the first 5MP camera phone and later in July of 2005, it announced the 7MP camera phones. In October of 2006, Samsung announced the first 10MP camera phone the SCH-B600, which has a zoom lens, 3X optical zoom, 15X digital zoom, flash lamps and support auto-focus. For now, Samsung has not introduced

these high pixels camera phones into China, but it is easy for the company to do this, which will be helpful for Samsung to increase its competition ability in the camera phone segment in China.

Looking to the future, upcoming 3G services in China will aid in promoting the development of camera phones. Generally, 3G phones will be equipped with two cameras to support video calls. With faster data rates offered by 3G networks, it will be easier for mobile subscribers to upload photos and videos taken by camera phones over the air onto web2.0 websites, such as podcasts and video-sharing websites, which will help encourage customers to use the camera functions on their phones. In this way, customers will demand higher requirements for camera phones, drawing more attention to the high-end segment.

Video Playing

Video playing is a new function for mobile phones. Currently, most multimedia handsets only support limited video formats such as MP4 and 3GPP. Some handset manufacturers, such as Nokia, Motorola, and Dopod can support more formats by embedding third-party media players like RealPlayer or Windows Media Player into their multimedia handsets. For example, RealPlayer can play video formats such as MPEG-4, H.264/AVC, H.263/3GPP, and RealVideo 8/9/10. Windows Media Player can play formats such as ASF, MPEG, WMA, WMV, etc. Considering the popularity of rmvb and rm formats on BT (BitTorrent) websites in China, we estimate that multimedia handsets will follow up the latest PMPs to support rmvb and rm formats in the future.

Handset manufacturers have instituted some optimization measures toward video playing applications. For example, some handsets can support full-screen playback or automatic horizontal-screen playback when users hold their handsets horizontally.

As for the codec, current multimedia handsets mainly support MPEG-4 and H.263, and they will support next generation codecs such as H.264, VC-1, and even the China-proprietary AVS in the future. Given the narrow and relatively expensive bandwidth of 3G networks, technologies which have higher compression ratio, such as H.264, will play an important role in promoting mobile video applications.

As for performance, current multimedia handsets can only support 30fps QVGA or QCIF playback. This is not the end, even though small-size screens on handsets normally have the highest resolution of QVGA. To output video streams to TVs or projectors for display, future multimedia phones will be required to support 30fps VGA playback.

Although the majority of multimedia handsets support video playing at present, video is not yet a practical or useful function for users due to limited formats, small screens, and a lack of appropriate video content. Therefore, video playback has not yet become a real selling point for handsets. In addition, a lack of end-to-end solutions is a critical reason why mobile video applications haven't been widely applied. The situation is expected to change after the deployment of 3G. Some service providers (SPs) have experimented with the existing 2.5G networks to provide video-on-demand services. China Transport Telecommunication Broadband Network Services Co., Ltd. (CTTnet), a leading company to offer video streaming media services in China, claims that it has over 370

thousands registered subscribers, one-third of which are paying subscribers. We expect that more video on demand services will be launched to promote the use of video playback in the coming 3G era.

Mobile TV

Mobile TV is regarded as a promising application of cell phones. In terms of technology, Mobile TV can be classified into streaming TV based on cellular networks and broadcasting TV. The development of China's Mobile TV has lagged behind that of Europe, Japan, South Korea, and other developed countries. But the pace of development will speed up in 2007, due to the commitment that the China government has made for Beijing to provide Mobile TV service for the 2008 Olympic Games.

Streaming Mobile TV

Streaming TV refers to the provision of TV programming to cell phones through cellular networks. It requires that terminals have a built-in media player, but this doesn't increase the cell phones' hardware cost. At present, Chinese mobile operators have begun to provide such experimental services on their 2.5G networks. For example, China Mobile has established cooperation with CCTV, Shanghai Oriental TV and Phoenix TV to provide mobile TV services based on GPRS networks. Currently, the resolution of Mobile TV service is QCIF, with a frame rate of 3–4fps, which is still far from attracting users' interest. Obviously, such a test is in preparation for the coming of 3G. With broadcast mobile TV subjected to uncertain standards, incomplete value chains and other factors, In-Stat believes that streaming TV will experience a faster development than broadcast mobile TV in China. However, because of the limited capacity of 3G networks and the high expense of data traffic, streaming mobile TV services will be limited to high-end users.

Broadcasting Mobile TV

Broadcast mobile TV refers to the provision of video programming to cell phones through broadcast networks, which generally requires adding a TV receiver module into cell phones. Currently, the biggest obstacle to the development of broadcast mobile TV is the lack of a unified standard. Now there are four technologies to compete for China's mobile TV standards: CMMB (China Multimedia Mobile Broadcasting) issued by the State Administration of Radio, Film and Television (SARFT), T-MMB (Terrestrial-Multimedia Mobile Broadcasting) submitted by the Beijing Nufront Software Technology Ltd., DMB-TH (Terrestrial Digital Multimedia TV/Handle Broadcasting) submitted by Legend Silicon Corp. and CMB (Cell Multimedia Broadcast) submitted by Huawei.

DMB-TH was originally intended for China's terrestrial digital broadcasting and wasn't optimized for mobile applications. Because it lacks support for the crucial time-slicing technology, power consumption of DMB-TH chips is too high to be used in cell phones. (With time slicing, each TV program is broadcast at a different point in time, so, when a user selects a program, the handset only receives that TV signal and can power down in between transmissions of that channel's content. Time slicing has been used in DVB-H as a key technology to reduce power consumption. Therefore, it may take a long time for the DMB-TH camp to optimize the standard so that it can be applied widely in mobile TV applications. Moreover, the DMB-TH camp is now focusing its effort on terrestrial digital broadcasting rather than mobile TV broadcasting.

CMMB is a broadcasting technology based on Satellite Terrestrial Interactive Multiservice Infrastructure (STiMi) transmission technology developed by the SARFT-affiliated Academy of Broadcast Science, while T-MMB standard is based on the DAB in Europe.

Huawei's CMB is a broadcast technology based on cellular networks, which is different from the other three broadcasting network-based technologies.

In-Stat believes that the major competition is between CMMB representing the broadcast camp and T-MMB supported by mobile operators. It was reported that the T-MMB standard has received support from China Mobile, China Unicom, China Satellite Communication and China Academy of Telecommunications Research (CATR) of MII.

Although a standard has not been determined, both the CMMB and T-MMB camps are accelerating the pace of industrialization. A sample of a demodulator chip based on the CMMB standard has been developed by Beijing Innofidei Inc. (The company was funded partly by the SARFT) at the end of March, 2007, and a commercial chip is expected to hit the market in August, 2007. The SARFT plans to build terrestrial test networks in Beijing before the end of 2007 to verify systems and terminals based on the CMMB standard and prepare for commercialization. The SARFT plans to launch a satellite working in the S-Band in the early part of 2008. Trial mobile TV services are expected to be provided in the first half of 2008. According to the plan, commercial mobile TV services will be first deployed in six Olympics host cities (Beijing, Shanghai, Qingdao, Shenyang, Tianjin, and Qinhuaodao).

On the other hand, samples of T-MMB-based chips are expected to be completed by Nufront Software Technology Ltd. in June, 2007. The T-MMB camp has not announced plans for system deployment and terminal development.

At any rate, mobile TV will become a reality in China in 2008. In-Stat predicts that cell phones with mobile TV receivers will be announced in the market in 2008, and mobile TV will become one of the most important functions in future multimedia phones.

3D Games

Currently, most multimedia phones support 2D games, and only a few high-end models support 3D games. Supporting 3D games puts higher hardware requirements on cell phones. Generally, it is a requirement to add an external 3D graphics acceleration engine or integrate a 3D graphics acceleration engine into the applications processor.

Handset manufacturers have introduced a number of game-oriented phones, such as Nokia's N-Gage and Motorola's E680g. However these handsets were not as successful as expected. This is mainly because the majority of game users place high emphasis on the gaming experience. Limited by IC processing capabilities, display screen size, and keypads, there is still a wide gap between the game performance of cell phones and that of PC or handheld game consoles (such as Sony PSP).

In-Stat believes that if promoted by chip manufacturers, such as TI and Marvell, cell phone games will gradually transfer from 2D to 3D, but 3D games won't become popular as fast as digital music playback has, and will be limited to the higher-end market during the next couple of years.

Connectivity

As handsets become multimedia devices, connectivity becomes increasingly important so that handsets can share content with other devices or access external networks. Therefore, we have seen that with richer functions, connecting technologies for handsets have been constantly enhanced. Connectivity technologies used by handsets can be divided into two types: wireless and wireline. Wireless technologies include infrared, Bluetooth and Wi-Fi, while wireline technologies include USB cable, TV-OUT, etc.

Wireless

With the popularity of Bluetooth in handsets during the past two years, infrared is no longer a must-have configuration. Especially, in some newly-released models, there is only Bluetooth instead of infrared. With Bluetooth also being used in handset-related peripheral devices, the legacy infrared interface will eventually disappear from handsets. On the other hand, Bluetooth in handsets has evolved from Bluetooth 1.1 to Bluetooth 2.0+EDR to support stereo headphones and a higher data rate.

Wi-Fi

The topic has been discussed for many years as to whether Wi-Fi will or should be integrated into handsets. Commercial Wi-Fi handsets didn't hit the market until the second half of 2006. Nokia, Samsung, and Dopod announced Wi-Fi enabled smartphones, the N80, the EW-700, and the C800 respectively in September, October, and November of 2006. The benefits of Wi-Fi integration are as follows:

1. Accessing the Internet at a faster rate where there is Wi-Fi coverage in the region.
2. It can support VoIP to help users save communications costs.

With Wi-Fi functionality, multimedia handset users can access a large amount of audio, photo, and video content available on the Internet. In addition, handset users can also upload user-generated content such as photographs and video to the Internet at a high speed through Wi-Fi. This is crucial to web 2.0 applications such as mobile blogs, podcasts, etc.

However, China's Ministry of Information Industry (MII), has prohibited the sale of integrated Wi-Fi handsets in mainland China. The reasons are as follows:

1. The Chinese government has not given up the plan to implement the WAPI standard nationwide.
2. Any kind of VoIP services not provided by carriers is constrained strictly by China's Ministry of Information Industry.

However, in the illicit market, Wi-Fi functionality is integrated into black market phones which are smuggled or don't have network access licenses issued by China's MII. Meanwhile, Chinese handset design houses and manufacturers are designing and exporting Wi-Fi enabled handsets for the European and other overseas markets.

Moreover, it was reported that China Mobile is considering customizing Wi-Fi handsets for its GoTone brand. Mobile users will be allowed to use VoWLAN while roaming abroad. Therefore, in the future, China is likely to loosen control over Wi-Fi handsets somewhat: Wi-Fi handsets will be allowed to be sold, but the use of the VoIP function will be limited.

Penetration rates for Bluetooth and Wi-Fi in handsets are predicted to rise gradually. Taking this in to consideration, IC suppliers, such as CSR, TI, and NXP, have integrated Bluetooth, Wi-Fi and even FM Radio into a single chip, which can save footprint, power consumption, and cost. These technical advancements will further promote the application of Bluetooth and Wi-Fi in handsets.

Wireline

USB has become a standard interface between cell phones and the PC. Currently, multimedia phones mainly use a 12Mbps full-speed USB (USB 1.1) or a 480Mbps high-speed USB (USB 2.0) interface. With lower chip costs and increasing user demand, we expect that high-speed USB will become the standard configuration of multimedia phones. Now, USB technology is going to wireless. As time goes by, wireless USB will be used in cell phones, so that users can be freed from the shackles of cables.

The TV-OUT port is an emerging interface on multimedia phones. It is used to output audio and video content to display on a TV, and has been commonly used in digital still cameras, DVDs, PMPs and other equipment. With the enhancement of video recording and playing functions, the TV-OUT port will be used in more and more multimedia phones. Currently, TV-OUT used in cell phones generally is an AV OUT port. We expect multimedia phones that support VGA Video Playing will use an S-video port for output to a projector. From a long-term perspective, the TV-OUT interface currently used in cell phones will transfer to digital interfaces, such as DVI, HDMI, etc.

Semiconductor Solution Trends

RF + Multimedia Baseband vs. ULC + Application Processors

A core semiconductor solution for mobile phones is comprised of an RF transceiver, baseband processors, and application processors, all of which may account for 20–30% of the cost for a bill of materials (BOM) for one handset. Before, these three parts were separate components: RF for signal receiving and transmitting, baseband for the communications modem and application processor for the OS and applications. This has changed as semiconductor technology has evolved.

For multimedia phones, a significant trend in semiconductor solutions is integrating multimedia processing capability into baseband chipsets. Taiwan-based MediaTek is a pioneer in offering multimedia baseband ICs. The company integrated an MP3 decoder, image processing, and/or a video decoder into its GSM/GPRS baseband ICs, thus creating different chipset product lines respectively for music phones, camera phones and video phones. By doing so, MediaTek reduces system costs and lowers design complexity, enabling the design of a multimedia phone at the price of a feature phone.

MediaTek's baseband solutions are highly competitive in mid-tier and low-end handsets where pricing ranges from US\$100 to US\$200, and were widely used by many non-licensed handset manufacturers in 2005. In 2006, MediaTek successfully expanded its customer base to most of the domestic brand manufacturers except Amoi, which drove its baseband IC shipments up to 70 million units a year.

As a result, multimedia baseband chipsets enabled the explosive growth of the multimedia phone market in China. In response to MediaTek's super success, other semiconductor vendors such as Spreadtrum, NXP, Broadcom, and Freescale also introduced multimedia baseband ICs, which will farther accelerate the development of the multimedia phone market.

To benefit from the quickly expanding multimedia phone market, there were some other emerging semiconductor solutions in 2006: one was the ultra low cost (ULC) platform plus applications processor; another was the multimedia-enabled single-chip solution.

The first solution uses ultra low cost chipsets, originally targeted at basic handsets, and pairs them with applications processors to create a powerful multimedia phone with an attractive BOM. Especially, Chinese domestic applications processor developers who don't offer a baseband solution are pushing this solution as a way to promote their applications processors. Both Anyka and Chipnuts have introduced complete reference designs that bundle their applications processors (Anyka's Ak3223 and Chipnuts' latest C7280) with Infineon's ULC1 GSM/GPRS chipset.

This solution will challenge multimedia baseband solutions in the future. Advantages of multiband solutions lie with lower cost, lower design complexity, and reduced development time. Disadvantages include the fact that multimedia baseband solutions will lead to product homogeneity. By contrast, applications processor-based solutions provide more powerful processing capabilities thereby enabling differentiated products. Their disadvantages lie with longer development times due to higher design

complexity and higher system costs due to the applications processors themselves, more memory needed and additional software costs.

In-Stat believes that multimedia baseband solutions will continue to dominate the mid-tier and low-end multimedia phone segments over the next two years, but as phone makers begin to design more powerful multimedia phones based on the smartphone platform, applications processor-based solutions will increase their share in the market.

Another solution is being provided by TI now. In November of 2006, TI announced a new platform codenamed "eCosto," which integrates TI's LoCosto ULC technology and the multimedia capabilities of the OMAP-Vox platform into a single chip solution. The eCosto is aimed at enabling lower-cost multimedia-rich feature phones priced at a range from US\$50 to US\$100. This single-chip multimedia phone solution will have somewhat of an advantage over multimedia baseband solutions in terms of system cost and development time. By launching the eCosto platform, TI wants to grab back its market share lost to MediaTek in the baseband market. It is expected that following TI, other ULC chipset providers such as Infineon, NXP, and Freescale will also add multimedia processing capabilities into their existing ULC platforms.

All of these technology improvements in semiconductor solutions will allow handset manufacturers to design more powerful multimedia phones at a lower cost, thereby boosting the development of the multimedia phone market.

Major IC Vendors

Top five baseband processor vendors in the Chinese market are MediaTek, TI, ADI, Spreadtrum, and NXP respectively. Major applications processor vendors include TI, Marvell, and domestic design house Anyka. Major coprocessor vendors are Chipnuts and Vimicro. Suffering from the popularity of multimedia baseband solutions, Chipnuts and Vimicro are shifting their focus to applications processors.

The table below shows main products offered by these semiconductor vendors and which design houses and handset manufacturers are using their chipsets to develop cell phones.

Table 2. Major IC Vendors' Main Products and Customers Overview

Vendor	Main Products	Design Houses	Handset Manufacturers
TI	Locosto, eCosto and OMAP-Vox platforms, OMAP2, and OMAP3 AP	Longcheer	Amoi, TCL, Lenovo
Marvell	PXA900/901 baseband processors; PXA270, and PXA300 series AP	CECW, SIM Tech, TechFaith, Yuhua	Moto, Samsung, Lenovo, ZTE, Haier, TCL, EastComm
NXP	Nexperia 5110, 5120, 5130, 5210, 5211	SIM Tech	Lenovo
ADI	AD6525/26/27/28/29, AD6720/21/22, TD-SCDMA Baseband: SoftFone-LCR/+	Longcheer, SIM Tech, Yuhua	Lenovo, Bird, TCL, Kanka, etc.
MediaTek	MT6205, MT6217, MT6218, MT6219, MT6226, MT6227, MT6228	Longcheer, SIM Tech, Tianyu	Lenovo, Bird, TCL, Changhong, Kanka, Haier, other domestic vendors, non-licensed phone makers
Spreadtrum	SC6600, SC6800, TD-SCDMA baseband: SC8800	CECW, Wingtech	Amoi, Lenovo, Hisense, other tier-two domestic vendors, non-licensed phone makers
Anyka	AK3223, AK3224	SIM	Tier-two domestic vendors like BBK, Ningbo Hantai, CECT. Bird and TCL have design in.
Chipnuts	Coprocessors: C625/C626/C627, AP:C7280	SIM	Tier-two domestic phone makers
Vimicro	Audio processors: VC0938/968; Camera controllers: VC0528/558/568; Coprocessors: VC0838/VC0858/VC0868	No	Samsung, LG, Bird, ZTE, UT Starcom, Lenovo, Ginwave

Source: In-Stat, 04/07

Multimedia Phone BOM

A multimedia phone's Bill of Materials (BOM) is comprised of such components as power management, memory, display module, application processor, baseband section, connectivity, camera module, RF transceiver, power amplifier, and other.

The power management section includes power management ICs needed for main processors, display modules, chargers and others.

The memory section includes NOR Flash for system code, NAND Flash for data storage and SDRAM for cache, but it excludes removable memory cards.

The display module includes the display panel and related driver ICs.

The connectivity section includes wireless connections such as IrDA, Bluetooth, and Wi-Fi, and wireline connections such as USB 2.0 and TV-OUT.

The camera module includes CMOS or CCD sensors and related controller and processor ICs.

The RF transceiver includes RF transmitters and RF receivers.

The power amplifier section includes power amplifiers needed for baseband and other parts.

The "Other" category includes the mainboard, shell, keypad, and other ICs and electronic components that are not included in the above 7 sections.

Basic Multimedia Phones

In-Stat estimates that basic multimedia phones' average bill of materials was US\$85.00 in China in 2006. This figure won't change a lot in 2007 as handset manufacturers will continue to enhance multimedia functions of entry-level feature phones.

Table 3. Basic Multimedia Phone Average Bill of Materials (BOM) 2006–2007 (US\$)

	2006	2007
Power Management	\$4.50	\$4.50
Memory	\$8.50	\$8.00
Display Module	\$9.00	\$9.00
Application Processor	\$6.00	\$6.00
Baseband Section	\$12.00	\$11.00
Connectivity	\$6.50	\$6.00
Camera Module	\$5.00	\$5.00
RF Transceiver	\$5.00	\$5.00
Power Amplifier	\$2.00	\$2.00
Others	\$26.50	\$25.50
Total BOM	\$85.00	\$82.00

Source: In-Stat, 04/07

Advanced Multimedia Phones

In-Stat estimates that advanced the multimedia phones' average bill of materials was US\$135.00 in 2006. Compared with basic media phones, the increased cost mainly comes from memory, the display module, the camera module, application processors, and connectivity sections. Moreover, additional peripherals such as high quality speakers and flash lamp also increase advanced multimedia phones' BOM cost.

We predict that cost for memory and the display module will increase slightly in 2007 as handset manufacturers continue to enhance storage systems and tend to design multimedia phones with bigger size screens. Meanwhile, the cost for baseband and application processors will decrease slightly as the result of the intensive competition among semiconductor vendors. Totally, advanced multimedia phones' average BOM will slide to US\$131.0 in 2007.

Table 4. Advanced Multimedia Phone Average Bill of Materials (BOM) 2006–2007 (US\$)

	2006	2007
Power Management	\$5.50	\$5.00
Memory	\$14.00	\$15.00
Display Module	\$13.00	\$14.00
Application Processor	\$15.00	\$14.00
Baseband Section	\$12.00	\$11.00
Connectivity	\$10.50	\$9.50
Camera Module	\$10.00	\$10.00
RF Transceiver	\$5.00	\$5.00
Power Amplifier	\$3.00	\$2.50
Others	\$47.00	\$45.00
Total BOM	\$135.00	\$131.00

Source: In-Stat, 04/07

Market Drivers and Constraints

Drivers

Free Content Available on the Internet

Free music available on the Internet drives the proliferation of MP3-enabled music phones in China as Chinese mobile users can easily download pirated music from the Internet and then upload it to their cell phones. The Internet is the most commonly used way for Chinese consumers to get free MP3 music files. This is for two reasons: 1. There are huge amounts of pirated MP3 files available on the Internet in China; and 2. Baidu.com (the No.1 Internet search engine in China) provides a dedicated MP3 search service that provides its users with one-click access to searched free music.

Moreover, to promote music phone sales, Chinese phone distributors are providing free MP3 file-downloading services to music phone buyers, which is an important way to provide access to MP3 files for those mobile users who have no computers or Internet access. However, the reason that phone distributors can do this is because it costs them nothing, as they also can provide users with pirated music from the Internet. (For more information, please refer to the In-Stat report *Music Phone Wins but Mobile Music Loses in China*, report #IN073878CWW).

Similarly, there is also a lot of video content available free on the Internet, which is a potential driver for multimedia phones.

The Continuous Improvements of Multimedia Phones in Terms of Features and Ease of Use

Cell phone manufacturers continue to improve multimedia functions to bring them closer to dedicated multimedia devices.

As for music, cell phone manufacturers have increased storage capacity and optimized a number of music functions, like One-click Player, 3.5mm universal headphones, and high-quality loudspeakers. In this way, professional music phones are comparable to a standalone MP3 player in audio quality, storage capacity, ease of use and other aspects.

As for photography, cell phone manufacturers are transplanting high-level functions from digital still cameras to high pixel camera phones, which make the photographic properties of cell phones close to entry-level digital cameras.

As for video playback, cell phones will be capable of playing VGA video at 30fps and also supporting output to be shown on TV or projectors.

These improvements will increase the attractiveness of multimedia phones to users and thus promote the development of the market.

The Development of Semiconductor Solutions

As we discussed above, integrated multimedia baseband chipsets stimulated the explosive growth of the multimedia phone market in 2006. Meanwhile, to catch the fast growing multimedia phone market,

there were some other emerging semiconductor solutions in 2006: one was the ultra low cost (ULC) platform plus applications processor and another was the multimedia-enabled single-chip solution.

These technology improvements in semiconductor solutions allow handset manufacturers to design more powerful multimedia phones at a lower cost, thereby boosting the development of the multimedia phone market.

Upcoming 3G Services

Even though the Chinese government hasn't released any 3G licenses so far, 3G networks have been deployed. As set forth by rulings from the Chinese Ministry of Information Industry (MII), China Mobile, China Telecom, and China Netcom built TD-SCDMA trial networks in 2006 in five cities (Beijing, Shanghai, Qingdao, Baoding, and Xiamen). According to the MII's latest plan, the TD-SCDMA trials will expand to ten cities in 2007 as part of an effort to conduct more large-scale tests for networks and terminals. Based on the results from these tests, the Chinese government is expected to simultaneously award three 3G licenses in the end of 2007 or the early of 2008.

If this scenario plays out, TD-SCDMA service will be available by the end of 2007, and WCDMA and CDMA EV-DO services are expected to be available by the end of 2008.

The new 3G networks will provide a higher data rate than the current 2.5G networks, which enables a series of new data services, such as video calling and video on demand. This will attract mobile users to shift to multimedia phones that can support new 3G services and applications.

Mobile TV

Mobile TV, especially broadcast Mobile TV, is expected to become an important application for handsets. It can provide real-time content, such as news, traffic, weather, and sports. For a large number of commuters who often have commute times of over 1 hour in large cities, Mobile TV will be a good application for killing time. As shown in In-Stat's latest survey to 733 Internet users in April 2007, 56% of the respondents are interested in cell phones capable of receiving broadcast Mobile TV.

According to previous analysis, China will provide broadcast Mobile TV services in 2008, which will become one of the key drivers to boost the future growth for the multimedia phone market.

The Combination of Mobile Phones and Web 2.0 Websites

Since 2005, about 200 video-sharing websites have sprung up in China, which are based on the web2.0 concept and are much like the American site, YouTube. Famous among these are www.tudou.com, www.wangyou.com, www.yogoo.com, www.6rooms.com, etc. In addition, traditional Internet giants, such as Sina, have become involved in this area since the beginning of 2006. This kind of video website has been warmly welcomed by Chinese Internet users, and view traffic has been skyrocketed. For example, the traffic ranking of www.tudou.com has risen to 177 worldwide in March, 2007, according to Alexa, a leading Internet traffic ranking service provider.

It is possible that the future will see cooperation between these web sites and mobile operators who will benefit by being able to provide video content to mobile users through cellular networks or the Internet. Meanwhile, mobile users can upload text, photos, or video content to these websites in the same way.

In the web 2.0 network era, multimedia phones will become the personal entertainment center capable of creating, editing, and browsing the content. Therefore, cell phone manufacturers are also working at improving their mobile phones. For example, the mobile Blog function has been added in some Nokia and Sony Ericsson cell phone models, so that users can easily upload the content created by their cell phones to their favorite websites. Moreover, the editing function has been enhanced in certain Sony Ericsson cell phones. MusicDJ, VideoDJ, PhotoDJ functions allow Sony Ericsson's users to make personalized edits to their pictures, easily and conveniently.

In-Stat believes that the combination of multimedia phones and web2.0 websites will promote mutual development. As for cell phones, such a combination will encourage users to create more content, thus stimulating them to use photography, video recording, and other functions. This, in turn, will enhance the demand for multimedia phones.

Constraints

Power Consumption Problem

Multimedia phones have integrated power-consuming audio and video playback functions. Furthermore, to enhance audio and video functions, multimedia phones are equipped with more power-consuming peripherals are such as higher power speakers, flash lamps with strong instant-consumption and larger screens etc. Currently, mainstream multimedia phones primarily use 2-inch, QVGA-resolution screens. Stimulated by Apple iPhone's 3-inch screen, cell phone manufacturers are planning to design and introduce more cell phones with over screens larger than 2.4 inches.

To strengthen communication with the outside world multimedia phone manufacturers have integrated a higher rate of wireless connection technologies, such as Bluetooth and Wi-Fi. As a result of the integration of more functions, multimedia phones need to be configured with a higher frequency processor. All of the factors mentioned above have made power consumption more and more overwhelming and battery life shorter and shorter.

Although power management technology has been improved continuously and batteries with over 1,000 mAh capacity have been in use, these still can't keep pace with higher power consumption resulting from an increasing number of integrated functions. The gap between power consumption and battery life is becoming more and more prominent.

Some new batteries, like fuel batteries, are being developed to solve such a problem. Hitachi, Toshiba, Samsung, and other companies are developing cell phones using fuel batteries which enable twice the communication time of a lithium battery. But there is still much room to improve in terms of size, heat, security, fuel supply and other aspects. It will take a few years to see large-scale application of fuel batteries in cell phones.

China's Constraints on Wi-Fi Functionality

As we mentioned before, currently, the sale of cell phones with Wi-Fi functions is banned in China by the Ministry of Information Industry, and it's still uncertain when such cell phones will be allowed to launch in the market. The lack of Wi-Fi functionality will deprive mobile users of high-speed Internet access. But this low-cost high-speed Internet access (compared with connecting via a cellular network) is of great significance for multimedia phones. On the one hand, it allows cell phones to browse news, pictures, and video on the Internet. While, on the other hand, mobile users can upload content, such as text, pictures and video to the Internet by means of Wi-Fi. The lack of Wi-Fi will restrict the use of high bandwidth video applications, thereby, reducing the attractiveness of multimedia phones to users, which has a negative effect to the development of the multimedia phone market.

Market Forecasts

Total Market Shipment Forecast (2006–2011)

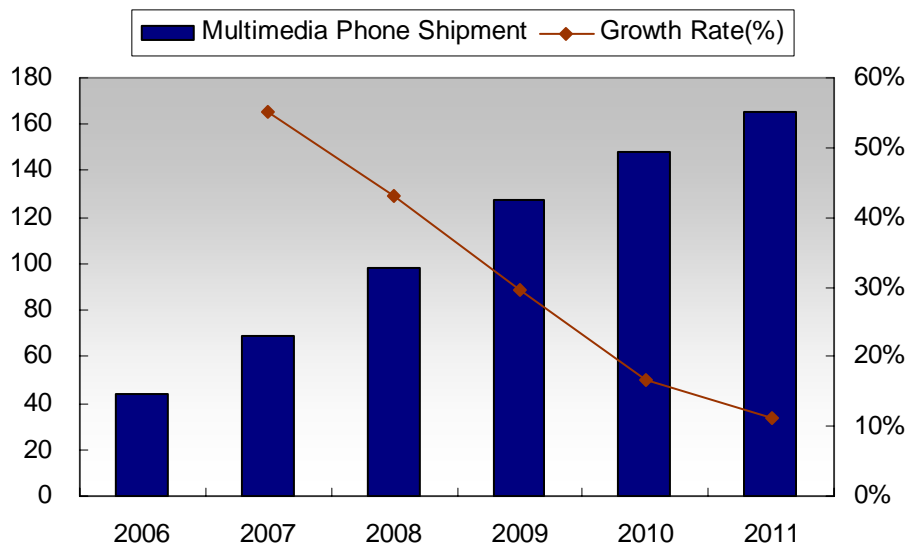
The multimedia phone market experienced a great development in 2006 as handset manufacturers introduced a lot of multimedia-centric new models during 2006. In-Stat estimates that multimedia phone shipments in China reached 44.2 million units in 2006, accounting for 34.0% in the total handset shipments. As phone makers continue to strengthen their development on multimedia handsets, the percentage will gradually rise up to 81.0% in 2011, resulting in unit shipments of 165.0 million in 2011.

Table 5. Multimedia Phone Shipment Forecast 2006–2011 (Units in Millions)

	2006	2007	2008	2009	2010	2011	CAGR
Total Handset Shipments	130	142.9	160.9	176.6	190	203.7	
Growth Rate (%)		10.00%	12.50%	9.80%	7.60%	7.20%	9.40%
Multimedia Phone Shipments	44.2	68.6	98.1	127.1	148.2	165	
Growth Rate (%)		55.20%	43.00%	29.60%	16.60%	11.30%	30.10%
Percentage of Total (%)	34.00%	48.00%	61.00%	72.00%	78.00%	81.00%	

Source: In-Stat, 04/07

Figure 3. Multimedia Phone Shipment Forecast 2006–2011 (Units in Millions)



Source: In-Stat, 04/07

Breakdown by Air Link

From the perspective of air link, In-Stat predicts that GSM/GPRS/EDGE handsets will continue to dominate the multimedia phone market in China, but its percent of total shipments will gradually decrease to 67.9% in 2011, from 92.8% in 2006. This is because of the growth of 3G phones in upcoming years.

We believe that Chinese mobile operators will provide handset compensation for 3G subscribers in order to increase 3G subscribers in a short time after the 3G network is ready. So, the majority of 3G phones will be customized handsets for mobile operators, which is totally different from 2.5G phones in China. It is expected that most 3G phones will be multimedia phones to utilize the higher data bandwidth afforded by 3G networks and therefore to push mobile users' ARPU.

We forecast that TD-SCDMA multimedia phone shipments will increase from 1.0 million in 2007 to 22.0 million in 2011, while WCDMA multimedia phone shipments will increase from 3.5 million in 2008 to 23.0 million in 2011. Our forecast for CDMA 1x EV-DO handsets is included in CDMA, which we think will remain a small market in China.

Table 6. Multimedia Phone Shipment Forecast 2006–2011 Breakdown by Air Link

	2006	2007	2008	2009	2010	2011
Total	44.2	68.6	98.1	127.1	148.2	165.0
GSM/GPRS/EDGE	41.0	63.1	83.3	99.0	111.5	112.1
% of Total	92.8%	92.0%	84.9%	77.9%	75.2%	67.9%
CDMA	3.2	4.5	6.5	7.6	7.7	7.9
% of Total	7.2%	6.6%	6.6%	6.0%	5.2%	4.8%
WCDMA	0.0	0.0	3.5	10.0	15.0	23.0
% of Total	0.0%	0.0%	3.6%	7.9%	10.1%	13.9%
TD-SCDMA	0.0	1.0	4.8	10.5	14.0	22.0
% of Total	0.0%	1.5%	4.9%	8.3%	9.4%	13.3%

Source: In-Stat, 04/07

Profiles

Multimedia Phone Vendors

Nokia

Nokia has been the largest handset vendor in China since 2004 by offering a full spectrum of competitive products ranging from US\$50 to US\$1000 to meet diversified customers' needs.

The N series of handsets, called "multimedia computers" by Nokia internally, are Nokia's flagship multimedia handsets, targeted at middle-tier and high-end markets between US\$300 and US\$800. The main products include the N70/N71/N72/N73/N75 series and the higher end N91/N92/N93/N95 series. All N series phones are equipped with a music player and camera functions, while particular models have enhanced functionality on one very specific area: the N70/N72 and the N91 are designed to be premium music phones, while the N73 and the N93/N95 are designed to be premium camera phones. Nokia, unlike Sony Ericsson, had not distinguished its music phone and camera phones clearly until it introduced a special music version for particular models like N70 and N73.

As for camera functionality, the best selling point for Nokia is the built-in professional Carl Zeiss lenses. Carl Zeiss is an optics lens manufacturer with a history of 150 years. Regarded as one of the best optics lenses, Carl Zeiss lenses are widely used in digital still cameras. The N series handsets adopt 2-megapixel and 3.2-megapixel CMOS sensors, support auto-focus, maximum 20x digital zoom and have integrated flash lamps.

As for shooting video, Nokia supports a maximum 30fps video recording in mp4 video format, electronic anti-oscillation and a maximum 4x digital zoom.

As for music playing, N series handsets support formats such as MP3, AAC, eAAC, eAAC+, etc. Built-in music players have a simple and convenient user interface. Some models feature embedded 4GB or 8GB capacity micro hard disks, which can accommodate thousands of songs. They have dedicated buttons for music playback and a standard 3.5mm headphone with a line-controller which is commonly used in standalone MP3 players.

As for video playing, Nokia has built a RealPlayer into its N series handsets, which enables the support of more video formats, such as MPEG-4, 3GP, Real Video and Real Audio files. Moreover, the RealPlayer can support streaming media and full screen playing.

All of the N series handsets are smartphones based on the Symbian OS with Nokia S60 user interfaces, which reflects the trend of the combination of entertainment and business. The ability to browse normal Internet pages from the small-size screen and to run various interactive web 2.0 applications to share music, photo, and video among friends brings customers all the possibilities to work, live and play. Furthermore, based on Symbian OS, N series handsets give mobile users the flexibility to customize their devices with extra functionality.

Aside from the N series, some other models designed by Nokia's Mobile-Phone department also provide multimedia functions and can be recognized as multimedia handsets. The 3250 and 6681 model handsets are examples of this.

Motorola

Motorola was the second largest handset vendor in 2006 in China. Motorola's primary multimedia handsets include the A series and the E series, such as the A1200, the ROKR E2 and the ROKR E6, all of which are based on Linux operating systems. These handsets are priced between US\$200 to US\$400 and are targeted at mid-tier and low-end markets.

As for camera function, these Motorola handsets usually have a 1.3-megapixel or 2-megapixel CMOS sensor, supporting the maximum 8x digital zoom and maximum resolution of 1600 x 1200.

As for video shooting, Motorola supports the highest resolution of 352 x 288 pixels. They also support an up to 2G removable memory card.

As for music playing, Motorola supports MP3, AAC, AAC+, WMA files and EQ adjustment, with a 3.5mm standard audio interface, which is common in PCs and MP3 players.

As for video playing, Motorola has built-in a RealPlayer which can support MP3, WMA, RealAudio, RMVB, 3GP, MPEG-4, MIDI, WAV, AAC, and AMR files. Motorola also supports full-screen playback.

Motorola's product lines are focused on middle-tier and low-end markets. Lack of high-end products makes Motorola at risk in the high-end market. Especially in camera phone market, Motorola needs to strengthen functionality in its handsets.

Samsung

Samsung was the third largest handset vendor in China in 2006. Samsung's multimedia handsets are priced between US\$300 dollars and US\$500 dollars, mainly targeted at middle-tier and high-end markets. Its flagship multimedia handsets include the SGHD528, the SGHD828, the SGHE908, the SGHX828, and the SGHi718. These handsets feature an ultra-slim design, looking simple and pragmatic.

As for camera function, Samsung generally provides a built in 1.3-megapixel or 2-megapixel CMOS sensor and integrated flash lamp. Samsung can support a maximum 7x digital zoom and continuous and time-lapsed shooting.

As for video shooting, Samsung can record a maximum resolution of 352 x 288 pixel video clips. During video shooting, Samsung supports synchronization zoom, exposure compensation, as well as a reverse image function.

As for music playing, Samsung supports formats such as MP3, AAC, AAC+, MIDI WMA, etc. In addition to providing play lists and different playback modes, EQ is also supported. Embedded equalizer and 3D sound effects enhance music playback performance. In terms of audio output, Samsung supports not only A/V headphones, but also Bluetooth stereo headphones.

As for video playing, they support video formats such as MPEG-4, 3GP and Real Video. Full screen playback is available.

The biggest selling point of Samsung's multimedia handsets is their ultra-slim fuselage design. Their multimedia performance has not made a profound impression. Because of the thin fuselage design, Samsung often use smaller capacity batteries, which has affected the use of multimedia handsets and has become a weakness.

Samsung is also taking the way that combines business and entertainment functions on its high-end cell phones. In ITU Telecom 2006 in Hong Kong, Samsung introduced the SGH i718, a Windows Mobile-based smartphone, which is equipped with a 2.8-inch QVGA screen and a 2-megapixel built-in auto-focus camera, making it a powerful multimedia handset.

Samsung is also a pioneer in high-pixel camera phones. By virtue of Samsung's digital camera technology experience, we believe that there is a lot of potential for Samsung in the development of camera phones.

Sony Ericsson

Sony Ericsson was the fifth largest handset vendor in China in 2006. Because of the huge success of its Walkman and Cyber-shot series handsets, Sony Ericsson became the fastest growing phone maker and a leader in multimedia handsets worldwide in 2006.

Sony Ericsson's success in the multimedia phone market owed to some particular advantages. They are as follows:

1. Sony Ericsson inherited Sony's leading brands in consumer electronics, such as Walkman and Cyber-shot.
2. Sony Ericsson inherited Sony's expertise in audio and image processing technologies. There is still a lot of room for Sony Ericsson to migrate Sony's professional digital camera technologies into handsets.
3. Sony took hold of Sony BMG and Sony Movie, which provide abundant music and video content. These resources could be used by Sony Ericsson to enhance its marketing capabilities.

Sony Ericsson was the first to distinguish music phone and camera phone clearly by introducing Walkman and Cyber-shot series handsets. Multimedia handsets from Sony Ericsson mainly include the K series (focused on camera functionality) and the W series (focused on music functionality). These handsets are priced between US\$350 dollars to US\$750 dollars, and are targeted at mid-tier and high-end markets. The flagship products include the K510c, the K790c, the W700c, the W810c, and the W958.

As for camera function, Sony Ericsson uses 1.3-megapixel to 3.2-megapixel CMOS sensors, provides a built-in Xenon flash lamp, and supports auto-focus, continuous shooting, self-timer mirror and a maximum 16X digital zoom. Sony Ericsson also supports BestPic function, anti-shaking and anti-red-eye functions, which are commonly used in digital still cameras.

As for video shooting, Sony Ericsson multimedia handsets support the highest resolution at 176 x 144 pixels.

As for music playing, Sony Ericsson supports formats such as MP3, AAC, etc., and provides dedicated buttons similar to Walkman players, such as start/pause, skip and stop, etc. Sony Ericsson provides Disk2Phone software which allows users to transfer music from CDs to handsets via a PC. Sony Ericsson also provides 3.5mm standard earphone interfaces, which are commonly used in PCs and MP3 players.

As for video playing, Sony Ericsson supports video formats such as MPEG-4, 3GP, and Real, and can play video clips with a maximum 176 x 144 resolution at full screen mode.

In the future, Sony Ericsson's advantages in multimedia handsets, especially camera phones will be more prominent, which will contribute toward increasing its market share. Sony Ericsson will expand its presence in the low-end market in 2007. In January of 2007, Sony Ericsson launched the W200, an entry-level Walkman handset, which is estimated to be sold at US\$150 and targeted at students and youngsters.

Lenovo

Lenovo is the fourth largest handset vendor in China. By focusing on the mid-tier segment of the market and offering quality-reliable products, Lenovo surpassed Bird to become the number 1 domestic phone maker in 2006.

Lenovo's multimedia handsets are mainly targeted at the mid-tier and low-end segments of the market, with prices ranging between US\$150 dollars and US\$250 dollars on average. The company's major multimedia handsets are mainly i series, including the i726, the i807, the i908, etc. By using MediaTek's baseband chipsets and total solutions, Lenovo provides cost-effective handsets with basic multimedia functions.

As for camera function, Lenovo uses a 1.3-megapixel or 2-megapixel CMOS sensor, and supports a maximum resolution of 1280 x 1020 pixels.

As for video shooting, Lenovo supports a variety of animation features. Lenovo also supports the white balance, exposure compensation, and shooting at night. Users can record video with a highest resolution of 352 x 288 pixels.

As for music playback, Lenovo supports MP3, AAC, AAC+, MID, WAV, and AMR music formats, with a professional sound cavity design for more balanced results. They also support synchronous lyrics, background playback, and the self-defined starting time.

As for video playback, Lenovo supports fluent full-screen playback with formats of MPEG-4, 3GP, H.263, etc.

In 2007, Lenovo's strategy is to strengthen its presence in the mid-tier market and to expand low-end and high-end markets. However, in the high-end market, Lenovo needs more technical accumulation to challenge Sony Ericsson, Nokia and other competitors.

In April 2007, Lenovo announced a new S9 series of handsets with fashionable design, targeted at the young female market. Besides an impressive appearance, S9 handsets also provide powerful multimedia functions, such as 2 mega pixel camera functionality, music, and video playback.

Amoi

Amoi is the seventh largest handset vendor in China. Amoi's multimedia handsets include A and E series, such as the A665, the A675, the E600 and the E850, which are mainly targeted at the mid-tier and low-end markets, with prices between US\$200 dollars and US\$300 dollars.

As for camera functionality, Amoi mainly uses 2-megapixel CMOS sensors and supports a maximum resolution of 1600×1200 pixels. Amoi has integrated a flash lamp and supports continuous, time-lapse shooting, white balance and horizontal shooting.

As for video shooting, Amoi supports the white balance, exposure compensation, and shooting at night. Users can record video with a highest resolution of 352 × 288 pixels.

As for music playback, Amoi supports MP3, AAC, MID, WAV, and AMR music files. Amoi also supports background playback, EQ equalizer adjustment, and HI-FI (high-fidelity) sound quality. Adopting the 3D surround sound audio enhancement technology, Amoi provides a lot of sound effect choices.

As for video playback, Amoi supports 3GP and MP4 video files at image resolutions not greater than 352 x 288 pixels. Amoi also supports full-screen playback.

As a pioneer in offering low-cost smartphones, Amoi set the trend of combining entertainment with business into middle-tier and low-end markets.

LG

LG dropped from the list of top five handset vendors in 2006. This is due in large measure to a lack of abundant product lines and limited marketing channels.

LG's major multimedia handsets are the Chocolate KG series, including the KG90 and the KG98, the KG338 and the KG928, etc., priced at a range between US\$300 dollars and US\$800 dollars, targeted at high-end and mid-tier markets.

As for camera functionality, LG uses 1.3-megapixel CMOS sensors to 5-megapixel CCD sensors, with 4X digital zoom and a very high resolution of 2592 × 1944 pixels. LG supports a wide range of professional-level film effects, continuous and time-lapse shooting, and multiple mode options.

As for video shooting, LG supports MPEG4 and H.263 video encoders and can record a maximum resolution of 176 x 144 pixel video clips in a 3GP format.

As for music playback, LG supports MP3, AAC, AAC+, MP4, WAV, WMA, AMR music files. LG provides many equalizer options, a variety of playback models, and multi-level volume control.

As for video playback, LG supports 3GP and MPEG-4 video formats.

LG has focused on the high-end handset market, which is unfavorable for extending its market share.

IC Vendors

ADI

ADI provides digital baseband processors and integrated analog and digital baseband processors for handsets.

Digital baseband processors include the AD6525/26/27/28/29 and the AD9000. Integrated analog and digital baseband processors include the AD6720/21/22. Main products used by Chinese customers are the AD6721 (Atlas-2H) and the AD6529 (Hermes).

The SoftFone AD6721 (Atlas-2H) GSM/GPRS integrated baseband processor reduces the cost and component count for entry-level multimedia phones. The digital processing section of the AD6721 is based on the SoftFone architecture with an ADSP-218x DSP processor and an ARM7 TDMI microcontroller running at 91 MHz and 78 MHz, respectively, with zero-wait-state on-chip SRAM. The analog processing section includes a radio interface, voiceband and stereo audio converters, speaker/headphone amplifiers, and a full power management and battery-charging subsystem. The battery-charging circuitry supports high voltage fast charging.

The AD6721 is software-compatible with the AD6527/AD6528/AD6529 (Hermes) family of baseband processors.

ADI has built cooperation with leading handset design houses such as Longcheer, SIM Tech and Yuhua. ADI also ships its products to tier-one domestic brand phone makers such as Lenovo, Bird, TCL, Kanka, etc.

ADI acquired its 2.5G platform software stack from TTPcom before the latter was acquired by Motorola in June 2006. Threatened by MediaTek, ADI is trying to help its customers reduce system development time from an original 9 months to 4 months.

ADI is also a leading vendor in TD-SCDMA baseband processors. To expedite the development of TD-SCDMA wireless terminals, ADI has built a portfolio of SoftFone chipsets for the design of basic voice and advanced multimedia handsets: SoftFone-LCR and SoftFone-LCR+.

Anyka

Guangzhou-based Anyka is a mobile multimedia application processor developer without baseband products. The company is offering the AK3223 and AK3224 processors, which are priced at around US\$5.

The AK3223 integrated comprehensive multimedia functions of audio and video, and a richer suite of peripherals, which enables the playing of MP4 movies and AAC/AAC+/ MP3/WMA/ MIDI music, to record video with sound, to capture still images, to support video calls, USB2.0 host/clients, MMC/SD cards, third party OS, etc.

Anyka can provide reference designs by partnering with baseband vendors like Infineon and ADI. Especially, Anyka is bundling its application processors with Infineon's ULC platform, which enables its

customers to design a high-end multimedia phone at an affordable price. This kind of combination has proved to be workable and helped Anyka to realize its first market breakthrough in 2006.

Anyka's IC shipments into this market have been estimated at more than 2 million units in 2006, most of which were shipped to small domestic handset manufacturers such as BBK and Ningbo Hantai. In 2007, Anyka has gotten design wins from Bird and TCL, and their mobile phones using the Anyka processors are expected to hit market in the second half of 2007.

To expand its market, Anyka needs to prove its product reliability, and get acceptance from system design houses and tier-one domestic brand manufacturers like Lenovo and Amoi.

As for its product roadmap, Anyka plans to announce a high-end applications processor that can compete with TI and Marvell's offerings in terms of performance in the second half of 2007.

Chipnuts

Shanghai-based Chipnuts is the developer of the Sunray series of multimedia coprocessors, which include the C625, the C626 and the latest C627 family.

The C626 family, introduced in May of 2006, is the second generation of Chipnuts' Sunray Series. The C626 is footprint- and pin-compatible with the Sunray C625 multimedia coprocessor introduced in January of 2005. The C626 family of multimedia coprocessors offers rich audio, multi-mega-pixel imaging, MPEG4 codec, storage and flexible data interfaces. The C626 has a built-in MPEG4/JPEG codec that allows the recording and playback of video and audio at advanced compression and frame rates. The latest C627 family was introduced early in 2007.

Suffering from the trend where IC vendors integrate multimedia processing capabilities into baseband processors, Chipnuts has struggled to survive in the coprocessor market. Its shipments are estimated at around 3.5 million in 2006, 60% of which was shipped in the first half and 40% of which was shipped in the second half.

In response to the downward trend, Chipnuts has shifted its business focus from coprocessors to applications processors by introducing the C7280 processor in early 2007.

Chipnuts is marrying its C7280 applications processor with NXP's [Nexperia](#) 5110LC GSM/GPRS chipset or [Infineon](#)'s ULC1 GSM/GPRS chipset, which is aimed at helping customers to create a powerful multimedia phone with an attractive BOM. To strengthen its system design capability, Chipnuts acquired a software design team of Hi-Tech Wealth in 2006.

Chipnuts' customers are comprised of domestic tier-two brand manufacturers and non-licensed phone makers.

Marvell

Marvell became an important IC vendor in the mobile phone market by acquiring Intel's communications and applications processor business at a purchase price of US\$600 million in June 2006. Marvell's offering is comprised of baseband processors and standalone applications processors.

Marvell's baseband processors include the PXA900 that supports communications processing for GSM/GPRS and Edge, and the PXA901 that supports GSM/GPRS and WCDMA communications. Its applications processors include the PXA255, the PXA26x, the PXA27x and the latest PXA300 series.

The PXA300 series, which includes PXA300/310/320, is the flagship product that Marvell is promoting. The leading PXA320 processor, with performance scalable to 800 MHz, plus additional industry-leading processing features, enables outstanding compute and video performance for high-end, multimedia cell phones and PDAs.

With high performance, Marvell's offerings are typically targeted at the high-end cell phone market. In order to get high volume shipments, Marvell is taking a more flexible marketing and pricing strategy than Intel.

Marvell is cooperating directly with tier-one phone makers (like Motorola Samsung and Lenovo) and tier-two phone makers (like ZTE, TCL and Haier). Meanwhile, Marvell is cooperating with leading handset design houses such as CECW, SIM Tech, TechFaith and Yuhua.

Marvell's offerings in the mobile phone market are complemented by Marvell's original expertise in wireless ICs (bluetooth, Wi-Fi, etc) and mixed-signal ICs (i.e. power management), which are helpful to enhance its competitive position in the market.

As for its product roadmap, Marvell plans to integrate its separate baseband processor and application processor into a single chip, following the trends to higher level integration.

MediaTek

Taiwan-based MediaTek founded its mobile phone business unit in January 2001 and announced its first GSM-only baseband processor, the MT6205, at the end of 2003. Based on the MT6205, MediaTek developed in succession the MT6217/8/9 and MT6226/7/8/9 series, which integrate multimedia processing capabilities into baseband processors, and are targeted at mid-level and low-end phone market.

The MT6218 adds support for GPRS, WAP and MP3 into MT6205 and is targeted at music phones. The MT6217 is a lower-cost version of the MT6218 and is pin-to-pin compatible with the MT6218. The MT6219 integrates a 1.3 Mega pixel camera processing IC and an MPEG-4 decoder into the MT6218, targeted at camera phones.

The MT6226 is a lower-cost version of the MT6219, which integrates a 0.3 mega pixel rather than a 1.3 mega pixel camera processing IC. The MT6228 is a high-end GPRS video phone solution, which supports a 3 mega pixel camera with auto focus, 3D games and a TV-OUT interface. The MT6227 is a lower-cost version of the MT6228.

MediaTek provides some advantages over its competitors. First, the high level of integration eliminates the need for external multimedia processing ICs, thereby cutting system costs. Secondly, MediaTek's products are 10%–20% cheaper than counterpart products from its competitors such as TI and ADI. Thirdly, and most importantly, is that MediaTek provides customers a package solution including chipset, operating system and third-party application software, thereby reducing customers' development time from the normal 6–9 months to 3 months.

As a result, MediaTek's baseband solutions are strongly competitive in mid-tier and low-end handsets that are priced at a range between US\$75 to US\$200. In 2005, MediaTek's main customers were handset design houses and non-licensed handset manufacturers. In 2006, MediaTek successfully expanded its customer base to include most of the domestic brand manufacturers, except Amoi, which drove its baseband IC shipments up to 70 million a year. MediaTek also got design wins from LG and Philips through a Taiwan-based ODM.

In October 2006, MediaTek acquired Pollex Mobile, a Beijing-based handset design house, at a price of US\$13 million to strengthen its design service and technical support in mainland China.

As for its product roadmap, MediaTek is expected to launch an integrated modem and application processor for smartphones and high-end multimedia phones in 2007. Meanwhile, the company is putting its research and development resources on cell phone-related wireless technologies, such as global positioning systems (GPS), Wi-Fi, Bluetooth, FM radio and WiMAX, thereby becoming a more comprehensive platform vendor for mobile phones.

Owing to its super success in the mobile phone market, MediaTek got about US\$1.6 billion of sales revenue and ranks top 10 in worldwide fabless IC design houses in 2006. However, there are some threats to the prospect of MediaTek.

One threat is too many followers, including Spreadtrum, Coolsand Technologies and Taiwan-based fabless companies like Via Tech, Sunplus and Micronix. These IC vendors follow up MediaTek's product strategy and market strategy, and will compete with MediaTek at a lower price.

Another threat is the competition from ultra low cost platforms. As Chinese customers begin to use the combination of ULC plus applications processors to design more powerful multimedia phones, this will threaten MediaTek's domination in the multimedia phone market.

The third threat is that MediaTek has no technology experience and product roadmap for 3G (mainly WCDMA), which is a risk to its growth in the long term.

NXP

NXP Semiconductors provides a full line of baseband processors covering ultra low cost phones, basic phones, mid-tier feature phones and high-end multimedia phones.

The main products NXP is promoting in China include: the 5130 for ULC phones, the 5110/5120 for basic phones, the 5210 for basic multimedia phones and the 5211 for music phones.

[Nexperia System Solution 5211](#) can add advanced and affordable [MP3](#) capability to mobile handsets. The solution supports stereo recording from FM radio, MP3 and video playback, a megapixel digital camera interface, USB charging, connect-to-PC and Bluetooth stereo.

The 5210 is a full quad-band GSM/GPRS/EDGE system solution that addresses the entry-level and mid-range Value Added Services (VAS) mass market—including GPRS/EDGE class 10—and offers multimedia applications such as still picture, video, MMS, Java, and WAP.

NXP's 5210 has gotten design wins from Lenovo, the number1 domestic brand phone maker and SIM Tech, a leading design house based in Shanghai.

Spreadtrum

Shanghai-based Spreadtrum is another major vendor of multimedia baseband processors. The company product and market strategies are similar to MediaTek's. Spreadtrum provides the SC6600 and the SC6800 series baseband processors.

The SC6600 series has integrated the multimedia processor with quad-band GSM/GPRS baseband into one chip, as well as built-in power management circuits. It provides cost-effective solutions for music and camera phones. The SC6600M and the SC6600D are the best selling products in 2006.

The SC6800 series of products are specifically designed for multimedia phone product applications. It has integrated multimedia processor & application processor with quad-band GSM/GPRS/EDGE baseband into one chip, as well as built-in power management circuits.

By shipping its multimedia baseband chips to domestic tier-one brand manufacturers (namely Amoi) and non-license phone makers, Spreadtrum's shipment is estimated at 10 million in 2006. Spreadtrum is also a leading vendor in TD-SCDMA baseband processors. SC8800 series are Spreadtrum's single chip solution of TD-SCDMA/GSM/GPRS dual mode baseband chips.

TI

As one of the top 10 semiconductor vendors in the world, TI has built full product lines for all segments of the mobile phone market. For basic phones, TI's LoCosto platform integrates TI's DRP technology, which applies digital technology to simplify RF processing in advanced CMOS process technology. Integrating the RF transceiver and analog codec with the digital baseband reduces board space and extends battery life. For feature phones and smartphones, TI provides chipsets that integrated modem and applications processors into a single chip, like the OMAP730, the OMAP850, the OM APV1030 and the OMAPV2230. For high-end multimedia phones, TI is offering standalone applications processors, including OMAP, OMAP2, and OMAP3 series processors.

In November 2006, TI announced a new platform codenamed "eCosto," which integrates TI's LoCosto ULC technology and the multimedia capabilities of the OMAP-Vox platform into a single chip solution. The first product in the eCosto platform is [OMAPV1035](#), which will be manufactured in 65nm and will support GSM, GPRS and EDGE standards.

The introduction of the eCosto platform will strengthen TI's competitive advantages in the mass multimedia phone market and help TI to recover its leadership in the baseband chipset market. By offering a series of high price/performance ratio multimedia baseband ICs, MediaTek has replaced TI in the number one slot for baseband vendors in the Chinese market with nearly 40% market share in 2006.

However, to compete with MediaTek, TI may need to take a more flexible market strategy. TI's current market strategy is to cooperate directly with selected brand phone manufacturers with a fairly high production scale, like Amoi, TCL and Lenovo. Unlike MediaTek, TI doesn't depend so much on

handset design houses to distribute its products, which means that TI may be missing out on a number of small customers and non-licensed handset manufacturers.

As for product roadmap, TI plans to integrate its DRP technology into all of its chipset families, thereby expanding single-chip solutions from ultra low cost phones to multimedia phones and high-end smartphones.

Vimicro

Beijing-based Vimicro provides three product lines for mobile phones: audio processors, camera controllers and multimedia coprocessors.

Vimicro's audio processors and camera controllers are very successful in the mobile phone market. Vimicro claims it was the number 1 audio processor vendor and number 2 camera controller vendor in China in 2006. Vimicro's top customers include Korean phone makers (Samsung and LG) and Chinese leading domestic phone makers (Bird, ZTE, UTStar, Huawei, and Lenovo). By introducing a cost-effective 1.3 mega pixel camera controller in the early part of 2007, Vimicro believes it will become the number 1 camera controller vendor this year.

Now, multimedia baseband processors dominate the mid-tier phone market and push out standalone audio and camera processors into two extreme market segments. In the low-end market, phone makers can use the ULC platform plus external audio or camera processors to design basic music phones or camera phones. In the high-end market that is not cost-sensitive, phone makers tend to use external audio or camera processors for a higher performance.

For its product line of coprocessors, Vimicro has three chips (VC0838/VC0858/VC0868) that have design wins from ZTE, Ginwave Technology and Huawei. Due to the popularity of multimedia baseband, Vimicro's coprocessor family is not as successful as its audio and camera processors. Its shipments of coprocessors were around 1 million in 2006.

So, Vimicro is trying to shift its focus to applications processors. The company has two applications processors in its 2007 product roadmap: one is expected to be in volume production in 2Q07 and another will have sample in 3Q07.

Conclusions

Multimedia functions have become the most important differentiating factor for handsets, and phone makers will continue to strengthen handsets' multimedia functions.

Especially, camera functionality and video playback will be the next big focus, followed by music playback. As phone makers are integrating high-level functions of digital still cameras into high pixel camera phones, professional camera functionality will be the next competitive focus in the high-end market. Meanwhile, bigger display screens will be increasingly incorporated into handset designs to improve video performance of multimedia phones.

To create powerful multimedia functions, building multimedia phones based on smartphone platforms will be a trend. We expect the combination of multimedia phones and smartphones will enable multimedia phones to be the personal communications, entertainment and business hub.

Moreover, handset makers need to enhance connectivity in mobile phones so that multimedia phones can access and share content with the outside world.

As the competitive focus of the mobile phone market shifts to multimedia capabilities, those handset manufacturers who have been involved in multimedia devices and digital still cameras will have advantages over other manufacturers in terms of technology integration. Sony Ericsson has leveraged such advantages provided by its parent company, Sony, to become a leader in the multimedia phone market. Samsung also has a solid vantage point into the competitive landscape of multimedia phones. Other handset makers need to strengthen their technologies in the multimedia sector.

Nokia has demonstrated the most rapid response to this by introducing its N series of multimedia phones, which have aided in maintaining its leadership position in multimedia phones. Motorola seems to be the one who needs to strengthen its multimedia phone offerings, especially in high-end products.

For most of Chinese domestic phone makers who are competing against each other intensively in the mid-tier segment of the market, the biggest problem facing them is how to differentiate their products from that of competitors.

Looking to the future, drivers for the multimedia phone market come from content availability, continuous improvements in semiconductor solutions, higher data rate wireless technologies, and the combination between mobile phones and the web 2.0 network. Especially, the combination with the web 2.0 network will have great impacts on multimedia phones in terms of applications and user experiences.

Methodology

This report covers China's multimedia handset market. Information contained in this report was obtained through a combination of primary and secondary research techniques that included the following:

Face-to-face and phone interviews

- In-person interviews with overseas and domestic mobile phone makers
- In-person interviews with overseas and domestic IC vendors
- In-person interviews with leading Chinese handset design houses

Key questions addressed

- Analysis of China's multimedia phone market
- Analysis of major multimedia phone vendors
- Analysis of semiconductors solutions for multimedia phone
- Analysis of major IC vendors for multimedia phone

Secondary research

- Analysis of In-Stat's proprietary market information and verification with other industry analysts
- Analysis of information reported in secondary sources such as websites, trade journals, newspapers, and magazines

It should be noted that the exchange rate between US dollar and RMB is set as 1:8 for the convenience of consistent calculations.

Glossary

ARPU: Average Revenue Per User. This refers to the amount of gross revenue a carrier can expect, on average, from its customers. Typically computed monthly.

ASP: Average Sales Price

BOM: Bill of Materials

MII: The Ministry of Information Industry

FPS: Frames Per Second

GPS: Global Positioning System

SARFT: The State Administration of Radio, Film and Television

ULC: Ultra Low Cost

VAS: Value Added Services

VoWLAN: Voice over Wireless LAN

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