Wireless/Mobile United States

by Charles Moon

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Under the Yankee Group Microscope: NTT DoCoMo's Third Year with Flash

Executive Summary

Flash Lite™ technology has become a de facto standard for most large Japanese mobile internet content providers. More than 20 million NTT DoCoMo subscribers have Flash® devices, including almost all of the 3G users.

Research Methodology

Yankee Group obtained data from nine major content providers in Japan that are responsible for more than 1,000 mobile internet sites. In addition, we surveyed another dozen smaller, unofficial i-mode content providers, as well as the two top carriers in Japan. Based on this research—and information from Adobe®, KDDI/au and NTT DoCoMo—we have estimated the penetration of Flash within the i-mode ecosystem.

Since the introduction of NTT DoCoMo's i-mode service in early 1999, Japan has become the world's leading market for mobile content and mobile commerce. Today, thousands of companies and organizations offer mobile content for i-mode and similar services by KDDI/au and Vodafone KK.

- Growing at a pace of more than 11% annually, the total mobile content and commerce market in Japan is likely to reach $11.3 billion during 2005.
- In 2004, blended i-mode ARPU (including basic subscription fees, package charges and premium site subscriptions) had reached an astonishing $16.78 or almost 25.8% of total ARPU.
- According to NTT DoCoMo statistics, in addition to spending significantly more on their overall mobile phone use, the operator's FOMA i-mode users spent almost 20% more than the average NTT DoCoMo subscriber, or $57.25 per month on voice services during fiscal year 2004.

Sophisticated information services using Macromedia Flash Lite from Adobe have characterized the first wave of innovation. But Flash Lite extends readily to the critical task of developing dynamic, highly customizable user interfaces. Such animated graphical user interface simplifies complex search operations, eliminating the need to navigate through a series of hierarchical text menus (see Exhibit 1).

- In early 2003, NTT DoCoMo began shipping Flash Lite on its i-mode handsets. Today, all new i-mode phones are shipping with Flash Lite.
- Flash Lite penetration continues to grow rapidly, with around 20 million DoCoMo subscribers currently using Flash Lite enabled phones (approximately 45% of total i-mode users).
- The migration of subscribers from 2G to 3G is accelerating, and NTT DoCoMo's focus on upgrading current mova handset users to the 3G FOMA network will help to increase overall Flash Lite penetration. Among the operator's 3G users, more than 90%, or around 14 million subscribers, have Flash Lite enabled phones.
- By the end of 2005, we estimate 50% of the operator's i-mode subscribers, or nearly 25 million users, will own a Flash Lite enabled device.
- Approximately 2,000 official i-mode sites are Flash Lite enabled, and this number continues to grow as new handsets, such as the 900 series, increasingly support higher Flash based files.
- We estimate 20% of the unofficial commercial i-mode sites are Flash enabled.

(Note: All monetary figures in this report are expressed in US dollars unless otherwise indicated.)

Exhibit 1

Flash Lite™ and the Wireless Graphical User Interface

Source: Japanese content providers and NTT DoCoMo, 2005

Flash Lite enables rich, graphic applications that deliver great usability

Sponsored by Adobe® — Adobe® commissioned Yankee Group to provide an objective assessment of the impact of Flash Lite™ on the Japanese mobile market. We devote our attention to NTT DoCoMo because this carrier has more than 3 years of experience with the technology.

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I. Introduction

The simplicity and low cost of text-based services—especially standard IP mail messaging—was an initial driver for i-mode adoption. Indeed, the shift to billing by traffic from a time-based format was nearly revolutionary at that time. Since then, the cost of data transmission continually has declined. The shift to 3G services with FOMA enabled NTT DoCoMo to reduce its tariffs per packet. This decline in transmission cost has driven traffic and i-mode mobile content is now advancing toward more sophisticated, increasingly graphics-based services.

The next mobile revolution is upon us—wireless phones used as music players, cameras and payment instruments. The user interface must make each application seem natural. Flash Lite can play a crucial role in this transformation of mobile phones into multifunctional handheld terminals.

To obtain a clear overview of the status of Flash Lite and its impact on the mobile content market in Japan, Yankee Group has undertaken a series of interviews with Japanese carriers and content providers.

In the following sections of this report, we provide an overview of the mobile content market in Japan, focusing especially on i-mode. We then detail the use of Flash Lite by NTT DoCoMo and KDDI/au. We review the leading Flash Lite applications, paying particular attention to the use of Flash to improve GUI and the user experience.

II. The Mobile Content Experience: Enter i-mode

When NTT DoCoMo launched its i-mode mobile internet service in early 1999, Japan was a traditional, voice-centric mobile market with no track record in data services. Today, i-mode is a mobile internet business ecosystem with more than 44 million users and thousands of participating companies that perform a great variety of mobile business transactions, from e-mail and games to booking rail and airline tickets.

NTT DoCoMo has steadily enhanced the value proposition of i-mode through a variety of additional and complementary services, such as the Java-based i-appli and—more recently—mobile phones enabled for Sony's smart card system FeliCa (see Exhibit 2).

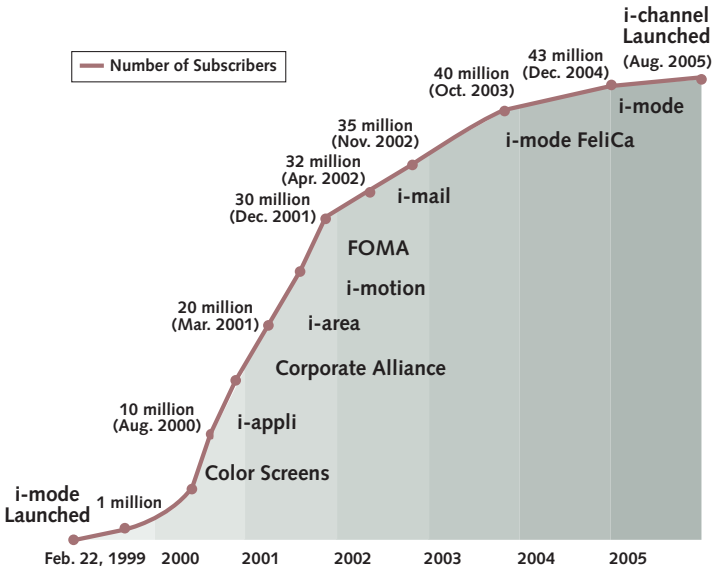
i-mode Critical Success Factors

The principal reasons for the success of i-mode include:

- **Low internet penetration:** At the time of service launch, the penetration of personal computers in Japan was relatively low compared to the United States and Scandinavian countries. Internet access was limited and prices for high-speed connections were among the highest worldwide. In this environment, i-mode emerged as an important and viable alternative to traditional PC-based internet access.
- **Unique, effective pricing model:** NTT DoCoMo's innovative billing model charged customers for data transferred (rather than access time). In Japan, this model is transparent and equitable compared to the access time model used by providers of WAP services. The operator subsequently introduced its flat-rate Pake-Houdai data plan to its 3G FOMA subscribers last year, which has enabled the evolution of more new services and functionality on handsets.
- **No "walled garden" approach:** Perhaps most importantly, NTT DoCoMo didn't attempt to control the market for mobile internet content but rather provided open access to the internet for mobile users while offering content providers the option to register their sites for a set percentage of revenue in the official iMenu.
- **Focus on usability:** Although the Japanese market is known for rapid adoption of new technologies, NTT DoCoMo has not taken its tech-savvy base for granted. The carrier has continuously improved the user experience (with technologies such as Flash), making its services accessible and attractive to the mass market.

More than 60% of total mobile internet users subscribe to NTT DoCoMo's i-mode service. NTT DoCoMo's success with i-mode has been imitated fairly well by KDDI/au and Vodafone KK. Because these factors were successfully executed across all three networks, the number of subscribers to mobile internet services in Japan is well above 70 million or roughly 86% of the country's total internet users.

Exhibit 2
The i-mode Timeline
Source: NTT DoCoMo



The Mobile Content Industry in Japan

The open-access approach taken by NTT DoCoMo has seen the number of companies that provided i-mode content at launch increase to tens of thousands of companies and organizations. Companies include startups by young entrepreneurs, subsidiaries of large companies in the entertainment and publishing industries, and spinoff companies from large trading firms.

Yankee Group estimates the mobile content and commerce market in Japan generated approximately $9.6 billion in 2004 (this figure includes operator data transfer revenue generated by such services), and will reach an astonishing $11.4 billion in 2005. Mobile content continues to grow in the double digits, with an 11% increase expected by the end of 2005. In addition, mobile advertising will grow by 35%, reaching $225 million by the end of 2005 from around $164 million in 2004. In terms of content usage, more than one-quarter of i-mode users currently receive entertainment-related information services, and 24% are ringtone and image downloaders. Gaming and horoscope content is also very popular, with 22% of users receiving this type of content.

Managing ARPU: The Crucial Role of Mobile Internet Content

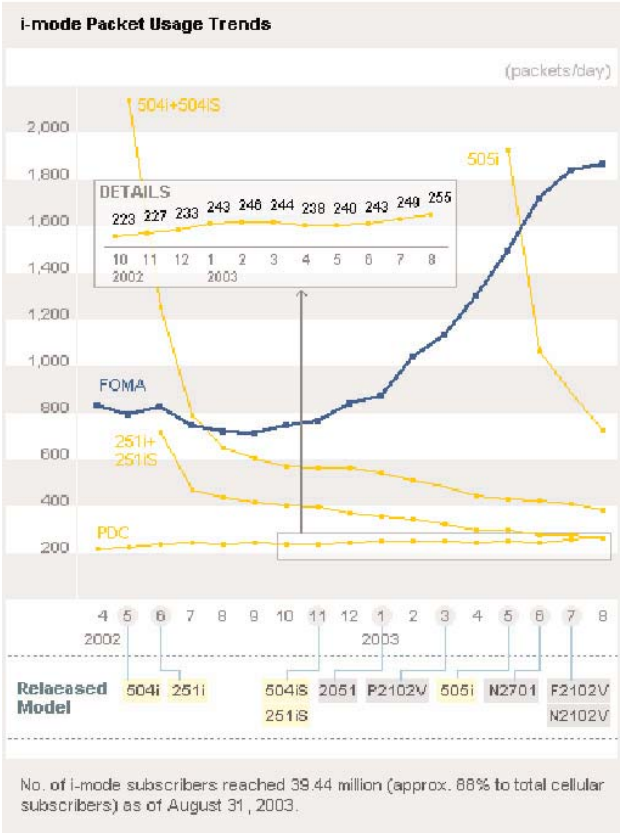
From the carrier's standpoint, the steady decline in voice ARPU is driving the urgent growth of mobile content businesses. It is important to note that ARPU in Japan has been much higher than in other countries, including advanced mobile societies such as Finland. To underscore the point, ARPU for i-mode services alone is now in the range of the entire ARPU of discount mobile carriers in Europe such as Virgin Mobile.

As Japan reaches mobile saturation, the pressure on mobile carriers in Japan to maintain revenue in the face of stiff competition has been considerable. According to NTT DoCoMo, ARPU during 2004 was around $65, down from $98 in 1998, the year before the launch of i-mode.

However, in 2004, aggregate i-mode ARPU (including basic subscription fees, package charges and premium site subscriptions) reached an astonishing $16.78 or almost 25.8% of total ARPU during that year. Clearly, mobile data services are playing a crucial role in reducing the negative impact falling voice ARPUs are having on overall revenue, although data ARPU has also started to fall.

According to NTT DoCoMo, package traffic spikes when new handsets with high functionality are introduced (see Exhibit 3). Consumers who purchase a new handset, such as the Flash enabled 901iS handset, tend to spend considerably on exploring the functionality and novel services offered by the phone. However, within 3 to 4 months, traffic decreases rapidly. An exception here is the FOMA service, which has had a steady increase in traffic. Although we do not have direct evidence, it is possible that Flash Lite contributed to this turnaround.

Exhibit 3
i-mode Packet Usage Trends
Source: NTT DoCoMo, 2005



III. Using Flash® at NTT DoCoMo

Together with Java, Flash Lite has been part of an effort at NTT DoCoMo to increase the functionality and usability of mobile phones. Flash Lite was first introduced in 2003 with the 505i series of NTT DoCoMo phones. Different from the web version of Flash, Flash Lite is not available for download—it must be preinstalled on handsets. The Flash Lite version for i-mode was developed in close cooperation with NTT DoCoMo. Currently, the Flash Lite player has been installed in 51 mobile phone models sold by NTT DoCoMo. The vast majority of 3G phones are Flash enabled 70x and 90x models. Currently, around 20 million NTT DoCoMo subscribers have Flash Lite enabled phones, and we expect this to approach 25 million by the end of 2005.

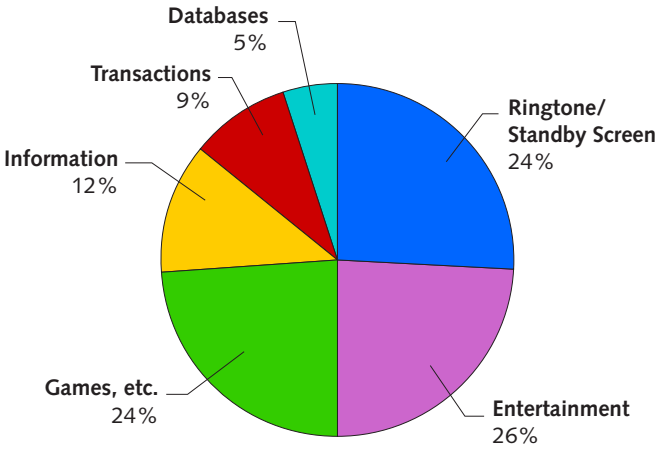
i-mode Content

As of September 2005, there were more than 4,600 official i-mode sites accessible through the iMenu on NTT DoCoMo phones (see Exhibit 4). Additionally, there were more than 87,000 unofficial sites.

The broad range of i-mode sites offer a corresponding variety of content, with "web-to," "phone-to" and "mail-to" functions adding greater convenience. Distinctive ringtones or standby screens that personalize subscriber handsets are a major component of the Japanese mobile content market. Interest in more advanced services, such as games enabled by the introduction of Java and Flash Lite, is now increasing (see Exhibit 5).

Exhibit 4
Number of Official i-mode Sites
Source: NTT DoCoMo, September 2005

Exhibit 5
Access to iMenu Content, June 2005
Source: NTT DoCoMo and Yankee Group, 2005



Flash Lite™: The New Standard for i-mode Content?

Flash Lite has become a de facto standard for Japanese mobile internet content providers. We interviewed nine major content providers in Japan that are responsible for more than 1,000 sites. In addition, we surveyed another dozen smaller, unofficial i-mode content providers. Based on this research and information from Adobe and NTT DoCoMo, we have estimated the penetration of Flash within the i-mode ecosystem:

- The percentage of Flash Lite enabled official i-mode web sites continues to grow rapidly. Although only 20% were Flash enabled at the end of 2003, this number is now closer to 40%, with approximately 2,000 official i-mode sites now supporting Flash Lite.
- Of the more than 87,000 unofficial i-mode sites, approximately 20% are Flash enabled.

Bandai Networks, a spinoff company from the Bandai Corporation and a major content provider, planned to have more than half of its sites using Flash by mid-2005.

Bandai's dedication to Flash Lite is underscored by its commitment to develop new functionality beyond what Adobe has provided in the Flash Professional 8 authoring tool. Together with Interchannel (formerly NEC Interchannel) and two other content providers, Bandai Networks developed a content generator software tool called Lite Work for dynamically developing mobile content using Flash Lite. This investment has simplified the creation of more complex applications that rely on rapidly changing data such as weather maps entirely presented as Flash Lite applications.

Not all content providers have been as rapid in their adoption of Flash Lite for mobile content development as Bandai Networks. For example, Index—a mobile content provider that was launched by Nissho Iwai, a large trading company—reported in late 2004 that only 20% of its sites are Flash enabled. Nonetheless, even Index—a company that produces little animated content—expects more than 30% of its sites will be Flash enabled within the next year.

Adobe's Flash technology isn't the only way to deliver vector-based graphics on mobile phones. The SVG-Tiny standard (which Adobe supports in its current 1.1 release) opens the door to competitive solutions. However, content providers appreciate the value of an established ecosystem as a major advantage to working with Flash. Companies we interviewed identified compatibility with their web-based Flash development and the large community of experienced Flash developers as major reasons for supporting Flash Lite over other graphics formats. In addition, several companies mentioned it was easy to speed development time of content using Flash Lite.

Flash Lite makes it much easier for designers to realize their concepts with high accuracy. Especially in complex projects with many partners, Flash helps to streamline the project workflow. Although we haven't attempted to quantify the impact of Flash Lite on time-to-market, content providers claim the development of complex projects such as short games using Flash typically takes only 3 to 4 months from concept to completion.

IV. KDDI's Flash® Initiative

NTT DoCoMo's main rival in the Japanese market, KDDI's au mobile service, released Flash enabled phones in mid-2004—almost a year after the release of Flash Lite by NTT DoCoMo. Penetration of Flash within KDDI is tracking with DoCoMo's rollout the year prior.

KDDI's approach to competition with NTT DoCoMo centers on a broad mobile internet content strategy with aggressive pricing. Attempting to leapfrog the market leader, KDDI incorporated the updated Flash Lite 1.1 into the most advanced KDDI phones. It licensed Flash Lite 1.1 to leverage the existing Flash Lite content, as well as quickly design its new, intuitive UI in Flash. The new UI can be consistently displayed across diverse handsets with varying OS, processors and screen sizes. NTT DoCoMo has since released 1.1, as well as Macromedia FlashCast® from Adobe.

Although the maximum file size used by the KDDI/au phones is the same as the NTT DoCoMo 900i FOMA handsets, KDDI's previously mentioned use of Flash Lite 1.1 differs in a number of instances from Flash 1.0, initially used by NTT DoCoMo:

- New features in Flash Lite 1.1 made it possible to update only a portion of the Flash content, a feature that enables effective network utilization and new application categories such as Flash based advertising.
- Flash Lite 1.1 added support for MP3 in addition to original audio formats: PCM, ADPCM and Yamaha's SMAF.
- Flash Lite 1.1 supports SVG-T, an industry-standard vector graphics specification.
- To seamlessly integrate Flash content with the handset, Flash Lite 1.1 enabled developers to access date/time, battery level and volume.
- Flash Lite 1.1 supports text input.
- Flash Lite 1.1 also provides network access and connectivity supporting the creation of dynamic applications and user interfaces.

Although this report focuses on the NTT DoCoMo experience with Flash Lite, the KDDI deployment proves that the Japanese market overall is increasingly embracing the technology (not just the i-mode ecosystem). KDDI is raising the technology bar with its deployment of the latest Flash Lite technology.

V. Flash Lite™ Applications

A phone with a 2.4-inch screen—even one with QVGA displays—struggles to entertain and inform the user. Flash technology proves invaluable on the phone because it saves clicks, provides a better visual experience and enables faster access to content.

All of the surveyed Japanese content providers indicated they are using Flash Lite to enhance hierarchical menus and to build user interfaces. Almost all large content providers list still or moving image delivery as a major application for Flash. Games and advertising were other leading application categories.

Animation, Animation, Animation

Image-related services are the main application area for Flash Lite. Image data delivered by Flash can be used for screensavers and still and moving images. Graphical applications include a broad variety of entertainment services, such as characters and comics such as Manga (see Exhibit 6). Moreover, Flash Lite is used to enhance e-mail content in the form of electronic greeting cards.

Developing Games Using Flash Lite™

Developing complex computer games using Flash Lite was difficult because of an initial limitation of the file size available for Flash in NTT DoCoMo handsets (20 KB). All new NTT DoCoMo phones, as well as Flash enabled KDDI/au phones, have raised the limit to 100 KB, which enables complex games. However, game developers such as Hokkaido-based Hudson point out other limitations (besides the Flash memory limitation) to the success of large games developed for mobile phones. Most importantly, playing complex games takes time. The battery life of most mobile phones is not suitable for lengthy gaming activity. Although average mobile phone users in Japan seem willing to spend a few minutes on a phone computer game while waiting for a train or commuting to work, fewer users are interested in more extensive and complex games that require considerable time. For games that take only a few minutes to complete, Flash Lite is perfectly suitable.

Exhibit 6
Flash Lite™ Screenshots
Source: Japanese content providers, 2005

VI. Building User Interfaces with Flash®

Sophisticated information services using Flash Lite have characterized the first wave of innovation. However, Flash Lite extends readily to the critical task of developing dynamic, highly customizable user interfaces. With an animated GUI, complex search operations can be simplified, eliminating the need to navigate through a series of hierarchical text menus. Animated graphics can help navigate through maps or complex graphical representations of data and information that are unwieldy on a standard 2.4-inch display.

A well-known example is the weather forecasting application that uses an animated GUI to select the target area. In earlier versions of the service, users had to navigate through multiple levels of text menus. The data for the service continued to be displayed in unremarkable standard text. This stands in stark contrast to the appeal and ease of use offered by the smooth Flash animation of the improved user interface.

Both carriers are using Flash Lite for interface elements. All NTT DoCoMo phones use Flash Lite for the iMenu, the i-mode service homepage. Elements of the GUI on the new KDDI/au phones are created using Flash Lite. In both cases, the user experience is clearly enhanced when compared to typical user interfaces on other phones. These experiences point to an increasing recognition of the potential for Flash beyond content delivery. In the case of complex information services on a 2.4-inch display, animated user interfaces enhance user service quality and experience. As mobile phones morph into indispensable and ubiquitous appliances, the user interface will become an increasingly important differentiator.

The user interface will become an increasingly important differentiator, and the epicenter of value creation on the device. We expect that the work of the Open Mobile Terminal Platform alliance in Western Europe will seek standardization at the applications layer with a view toward concentrating differentiation at the user interface.

The concept of the highly utilitarian, differentiated user interface extends well beyond the mobile terminal. Flash Lite can be used in a number of devices, including digital cameras, car navigation systems and set-top boxes. Graphic and animated user interfaces with low-response latency can be used in every device that has a graphic display, including office machinery such as copy machines. In addition, providers can easily implement Flash as a GUI layer on embedded operating systems.

Flash offers two important technical advantages over the HTML/WAP browser:

- Flash Lite has response latency in the 0.1-second range, which is impossible to achieve with standard HTML/WAP browsers.
- Like Flash, Flash Lite is a unified platform and developers need not worry about different implementations, as is the case with HTML.

Equally important, Flash and Flash Lite help customers develop sophisticated GUIs for embedded applications in a much more straightforward fashion than currently available alternatives. As a technology that was originally developed for designers (rather than software engineers), Flash Lite also offers important advantages over Java virtual machine technology. Notably, using Flash mobile technology, designers can develop the user interface by themselves and need not rely on engineers for the implementation. Consequently, companies will be able to streamline the development process and reduce development time for GUIs. Eventually, this will help companies develop better and more attractive products in less time.

A number of shortcomings remain even in the most recent version of Flash Lite that limit the use of Flash for user interfaces. For example, the "load movie" function in Flash Lite 1.1 only supports Flash files, not other video or animation formats. Although the challenges identified by the content providers are significant, Adobe can address them in successive software iterations.

The next mobile revolution is upon us—multifunctional terminals capable of making payments at a point of sale. As the phones are used to facilitate physical-world interactions, the user interface has to enable a fast transaction (otherwise, the user won't see the phone as the convenient universal remote control). Flash Lite can play a crucial role in this transformation of mobile phones into multifunctional handheld terminals.

UI for Late Adopters: NTT DoCoMo's i-channel

Even in Japan, you can find folks who don't use mobile data services. With flat, even declining revenue, NTT DoCoMo is eager to push data services on these late adopters. NTT DoCoMo is using Adobe technology, FlashCast, to make it happen.

Exhibit 7
i-channel Scrolling Ticker
Source: Adobe, 2005

For late adopters, clicking through two or three screens to get to a data service is a barrier that keeps them from exploring mobile data offerings. The i-channel service puts offers right in front of the user by using a ticker that scrolls along the bottom of the display interface that advertises services and offers information (see Exhibit 7). New phones for these late adopters have the scrolling tickers and an i-channel button to one-click for more info, or to access the browser.

This service is interesting for operators to watch for two reasons: 1) as an advertising model for carrier branded and third-party services and 2) as a customer relationship model (e.g., this technology could be used to display minutes remaining on a prepaid plan). Of course, it is also interesting to look into the future and imagine strategies for converting late adopters to mobile data—once the mass market is already on board (a problem most operators outside of Japan would like to have sooner rather than later).

The technology for FlashCast is fundamentally different from Flash Lite. This is a client/server model, with locally stored information on the client that is updated in the background.

VII. Conclusion: Flash® and the Future of the Wireless Industry

The market for mobile devices demands unprecedented flexibility to cost-effectively meet the demands of multiple, distinct enterprise and consumer segments. Operators demand the ability to offer customized branded user interfaces and content, and end users demand personalization. This can be achieved by harnessing robust, open, scalable client software that mitigates the cost and complexity of addressing market-specific dynamics, while creating value for customers.

The recent content initiatives launched by NTT DoCoMo and KDDI show that Flash technology is a key differentiator in highly competitive, mobile-content-oriented markets. As the data experience becomes the focus of competition, we expect to see an emphasis on technologies such as Flash Lite. The experience in Japan increasingly will be influenced by the ubiquity of Flash Lite.

The ability of Flash Lite to enable a superior GUI is the most compelling capability for all players in the wireless value chain. Value in the mobile handset market is migrating and concentrating at the user interface and applications layer. Flash Lite offers significant potential for competitive differentiation. With Flash Lite, user interfaces easily can be changed, adapted and customized. This offers compelling branding and personalization options for operators, content providers, end users and device manufacturers.

Adobe Flash technology is not the only way to deliver vector-based graphics and a compelling UI on mobile phones. Yet Adobe—with its experience in Japan, traction with OEMs, and especially its community of developers—has a compelling proposition.

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