

# Mobile Gaming

An Introduction to the Mobile Gaming Market



**Written by Jennifer James**  
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See also <http://www.games4mobile.com>

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## INTRODUCTION

This whitepaper summarizes the 217 page “Mobile Gaming” report written by Jennifer James and published by Mobile Streams. The full “Mobile Gaming” report breaks the wide range of relevant issues into five sections.

Section 1, Mobile Telecommunications Technologies, investigates the technologies that support the evolution of mobile gaming, beginning with network architecture and functioning. Each subsection analyzes a generation of technology related to mobile gaming (SMS, WAP, and 3G) in some depth. Technical overviews lay the foundation for discussion of related technologies, key applications, usability analysis, games design, and problems associated with delivery of effective mobile games.

Section 2, Parent Industry Overviews, outlines and analyzes market factors related to mobile gaming from the broad perspectives of the wireless and digital games industries. Certain characteristics of each industry are emphasized in order to provide insights into relevant issues driving or creating obstacles in the evolution path of mobile gaming. A case study on i-mode provides comparative analysis and discusses the potential threat to Western WAP services.

Section 3, Mobile Gaming Market Analysis, delineates the business case for mobile gaming and compares the potential of established gaming giants and mobile games startups. Each subsection tackles a key aspect of the market, including existing and prospective revenue models, target user profiles, and marketing strategies.

Section 4, Games Analysis, focuses exclusively on issues related to quality of games content, starting with a domain overview introducing the entertainment value of games from a consumer perspective, popular digital games genres and their potential for generating successful mobile games, and the elements of effective games from a user-centered design perspective. This is followed by reviews of 50 existing mobile games by several avid gamers drawn from target market segments in order to exemplify user reactions to current mobile games. Analysis of the results includes comparative discussion and recommendations for avoiding the pitfalls occupied by some of the games tested and maximizing effectiveness of future games.

Section 5, Vendor Profiles, provides business and contact information for numerous mobile gaming companies. Some of these companies responded to a questionnaire asking penetrating questions about their perspectives on and operations in the realm of mobile gaming, providing the reader with in-depth profiles.

Section 6, Conclusions, summarizes key findings and provides strategic recommendations for every link in the value chain.

*Mobile Gaming* provides an accurate and comprehensive source of information about the environment for development and deployment of mobile games around the world.

To order the full "Mobile Gaming" report, visit [www.games4mobile.com](http://www.games4mobile.com)

## **MOBILE GAMING MARKET ANALYSIS**

The mobile gaming market is at an early stage of evolution wherein fundamental strategies for success are crudely defined and implemented. At present, mobile gaming is an emerging market subject to the disruptive principles of emerging mobile technologies. Its distinction from most other emerging markets is that it represents the convergence of two enormously successful industries. The companies who survive the fledgling term will develop more lucrative revenue models, learn more about their potential and existing consumers, and employ effective marketing strategies for expanding their user base.

### **BUSINESS CASE**

Although the business case for mobile gaming is somewhat different from the respective parent markets of wireless communications and video games, enormous enthusiasm for electronic games and increasing sophistication of wireless devices and networks suggest a cogent business case for mobile gaming. Certainly, the global evolution of the mobile industry will eventually result in ubiquity of suitable hardware devices and networks better optimized for data transmissions. The factors differentiating mobile gaming from console and PC forms include the comparatively primitive level of network and device technology available at present, inherently smaller, monochrome display capabilities, the absence of a wide variety of products, and limited distribution channels.

However, mobile gaming retains a distinct advantage over fixed technologies in that previously entertainment-impooverished situations can be occupied with gaming, the preferred form of entertainment for hundreds of millions of consumers. This is a tremendous advantage. This type of value-added service is expected to generate a great deal of revenue, because for millions of users, a mobile phone or dedicated wireless gaming device will be the primary means of occupying "dead time". Portable gaming consoles like Gameboy Advance will become less competitive if high-quality content is available on mobile devices, although convergence is a strong likelihood.

### **GAMES GIANTS VS. MOBILE GAMES STARTUPS**

Established digital games companies are increasingly recognizing the potential of mobile gaming. Partnerships between wireless companies, i.e. network operators or device manufacturers, and video games giants have emerged, including collaborations of Motorola with Sega, Nokia with Eidos, Orange with Rage, and NTT with Nintendo. The larger companies may be less familiar than the start-ups with the restrictions of a wireless medium, but have the staff and resources to overcome that obstacle rapidly. These companies will have the advantage of leveraging their existing brands to target markets and migrating content across multiple channels, threatening the staying power of even the strongest start-ups. For the moment, start-ups retain the advantage simply because their business plans revolve exclusively around the new market and can be adapted more seamlessly to changes in the market. Problems related to solvency are of

course the biggest hindrance for companies in a market where the underlying technologies are being implemented at a relatively slow pace and revenue models are largely dictated by the distributors rather than the suppliers.

### **INDUSTRY ALLIANCES**

The myriad issues facing the mobile gaming industry have spawned the formation of industry groups who intend to tackle them collaboratively. The Mobile Entertainment Forum (<http://www.mobileentertainmentforum.org>) is an industry group founded by mobile entertainment companies focused on cooperative resolution of issues relating to mobile entertainment. Committees specifically concerned with gaming have formed under its umbrella, while forum events such as conferences and awards ceremonies help bring industry players together and gain exposure for mobile entertainment applications.

Ericsson, Motorola, Nokia, and Siemens founded the Mobile Games Interoperability Forum (MGI Forum) to define standards and develop certification procedures to advance the mobile gaming industry. Their "Universal Mobile Games Platform" initiative is based on developing a global open standard for production and deployment of mobile games. Companies at every stage of mobile games deployment are encouraged to join, including game publishers and developers, game platform vendors, game service providers, mobile network operators, additional device and infrastructure vendors, and service integrators, so that a robust mobile games industry alliance is formed to produce a specification that will benefit companies positioned at every level of the value chain. Interested parties can contact [mgif@mchp.siemens.de](mailto:mgif@mchp.siemens.de) for information on how to join. Developer support, test facilities, and certification procedures are facilitated by Ericsson Mobility World (<http://www.ericsson.com/mobilityworld/>), which includes Ericsson Developers' Zone, Motorola's Applications Global Network (MAGNET) Program, Forum Nokia, and Siemens' Mobile-Partners Program.

The GSM Association (<http://www.gsmworld.com>) has also released guidelines for implementation of data services deployed on its networks. The Association maintains a steadfast commitment to supporting related industries and serves as a valuable source of intelligence concerning GSM technologies and services.

### **REVENUE MODELS**

This is an area of fundamental importance to the business case for mobile gaming. Ongoing redefinition and refinement of revenue models is necessary for mobile gaming ventures as technical and market factors change and evolve. Many existing companies were reluctant to share information concerning their revenue models for fear of compromising their competitive advantage. In some cases, companies reported that revenue models were still under refinement, reaffirming the complexity of this particular aspect of implementing wireless games services.

## **VALUE CHAIN**

At present, fragmentation in the value chain poses an enormous problem for small mobile games makers. The service chain for this industry typically looks like this:

**Developers > Publishers > Wholesale > Retailers > Consumers**

There are many variations of this chain, with many companies occupying more than one role. Games studios generate mobile games applications, which are published in-house or by a larger entity. Publishers may have deployment platforms that they license along with applications directly to operators, as in the case of Digital Bridges. Nokia is soliciting a wide range of games content from numerous studios and publishers in order to develop a strong wholesale market position by offering applications along with a stable deployment platform. This takes advantage of their influential relationships with operators that are not shared by independent games companies, since they produce handsets as well as various hardware and software solutions upon which many operators depend. Nokia's Mobile Entertainment Service and Digital Bridges' Unity are promising examples of wholesale packages that maximize distribution possibilities by supporting a wide range of protocols, languages, and devices, creating flexible models for wireless service deployment. The specifications vary, but generally include a server package combining proprietary software and established technologies for deploying games, facilities for storing and tracking user data, Application Programming Interfaces (APIs) for applications development, and bundled applications. Nokia's service includes an extensive Developer Program to encourage commercialization of mobile games and other entertainment applications. Custom applications and configurations tailored to specific operator needs add to the substance of current wholesale offerings. Operators, who employ various consumer pricing models, act as retailers for mobile games. Operator portals encompassing a wide range of data services or tailored to entertainment are becoming commonplace.

## **REVENUE SHARING**

A logical model for wireless games companies is based on revenue sharing with network operators, who provide the backbone for transmission of SMS and WAP game data. Operators provide product visibility as well by marketing gaming services to existing and potential subscribers. A user who plays one SMS game is likely to engage in at least 10 transactions, which can generate significant revenue for both the network operator and gaming company (depending on the revenue split) despite low prices per transaction. Cash-U suggest basing charges on the perceived value of different SMS games, but such schemes are generally implemented at the operator's discretion. The network operator can also implement reverse charging for game screens requested by the user. It is unlikely that users will be interested in paying more than a marginal fee per transaction, since current pricing schemes often result in significant inflation of phone bills for a relatively primitive entertainment experience. Revenue sharing for WAP games is based on airtime with regard to Circuit Switched Data and a range of emerging payment options for packet-based connections. One of the revenue-related problems with mobile gaming

thus far is that Circuit Switched Data's slow transmission rate has resulted in charges that consumers find exorbitant, resulting in diminishing marginal returns. As GPRS overtakes Circuit Switched Data as the dominant bearer for WAP games, less expensive tariff structures should assuage this problem.

Unfortunately for application providers, network operators often retain the lion's share of revenues. They seem unwilling to realize that in order for the mobile gaming industry to thrive and develop better value-added services, operators must share more of the revenue generated at their end of the service chain. Difficulty securing favorable agreements with and general cooperation from operators is one of the mobile gaming industry's most fundamental limitations. Reported revenue splits fall between 10-50%, which at current levels of usage, though significant, cannot enough to sustain applications providers in the long run. Digital Bridges employs a seemingly successful revenue sharing model wherein they only charge when operators generate revenues and in turn pay content developers, to whom there is no cost for having games hosted.

The more favorable structure of i-mode's relations with third-party application providers, wherein they take a 9% commission and pass the remaining revenue along the service chain, should give operators in other markets pause. The success of NTT DoCoMo's model and much higher games usage patterns among i-mode users compared to other wireless subscribers exemplify the value of mobile gaming. Moreover, with NTT DoCoMo poised to extend its reach to numerous global markets, there is a possibility that the growth of mobile gaming will shift heavily in favor of i-mode content, creating churn and substantial revenue loss for many operators offering SMS and WAP content. Perhaps gamers will flock to i-mode for the better variety of games resulting from NTT DoCoMo's strong relationships with application providers. The companies having trouble establishing favorable revenue sharing agreements may optimize their games for i-mode and abandon attempts to deploy games through stingier operators. They may have a strong incentive for making this shift if Nintendo's relationship with NTT DoCoMo results in a fully wireless dedicated gaming device stamped with the Game Boy brand. Uncooperative operators are not adapting their strategies to the conditions of the burgeoning mobile gaming industry. This short-sightedness may hamper the mobile gaming industry's growth in the short run, but may change if operators come to understand the strong role of mobile games in driving up data traffic.

## **LICENSING**

Some wireless games companies circumvent the niggling aspects of establishing revenue sharing agreements by licensing wireless games services in much the same manner as one might license copies of software. In this case, the payment structure changes radically to a series of transactions that occur prior rather than after games deployment. Operators pay wholesalers for licensing their deployment technologies and games, wholesalers pay publishers for distribution rights to copyrighted applications, and publishers buy the copyrights from games studios or independent developers.

## **RETAIL**

On the retail end, a revenue model in which games are available on a subscription basis with monthly fees has met with success in Japan and for some online games services. Payment schemes allowing “hardcore” users to pay a flat fee for unlimited use and pay-per-use options for “casual” gamers make sense for maximizing volume. However, fee-based games are generally more complex than free ones. In this case, an array of compelling games should entice subscribers. For the most part, only operators can employ this model at present, since they control billing for all end-user wireless services. Overall, the strategy of requiring service subscription payment in addition to line charges is widely considered a poor one in terms of maximizing volume. Lower wireless connection charges and convenient payment methods would boost this model’s effectiveness considerably. Open mobile Internet models and secure m-payment technologies may eventually create opportunities for more direct and universal distribution channels involving independent portals.

At present, lack of secure m-payment technologies would require that subscribers of independent portal services use the Web in order to obtain a subscription. Device and operator restrictions might also prevent a significant market emerging for direct services, since operators seem unwilling to open a billing API for third-party developers. Successful implementation of an operator-independent portal strategy is highly unlikely until after various m-payment schemes are implemented and users have open access to mobile Internet content. Even then, users acclimated to online gaming will only be willing to pay subscription fees for access to truly compelling content.

## **ADVERTISING SALES**

Advertising provides another revenue stream possibility at the retail end of the service chain. However, models based on advertising alone have proven shaky and foreshortened the survival of many e-commerce ventures, yielding one of the most important lessons of the recent free-falling dot-com debacle.

## **SUMMARY**

The incipient revenue models for mobile gaming are inadequate for producers and could cause the market to stagnate in the near term. However, the market is still young and will likely metamorphose in the next two years. Companies who have not established a near-term strategy for surviving the early stages of market growth may become victims of the wireless industry’s lagging development of nonvoice technologies and seeming unwillingness to provide sufficient compensation to third-party application providers.



## USER PROFILES

Specific market research concerning the audience for wireless entertainment services was difficult to find despite extensive research into the subject. Several mobile gaming companies offer unqualified statements regarding target market segments, but valid data are not readily available.

### DEMOGRAPHICS

Cash-U and Digital Bridges, in addition to many other mobile games companies, are focusing their marketing efforts on teens. Consumers of existing portable consoles like Gameboy Advance are primarily teens. This may have more to do with the youth-oriented brand developed by Nintendo than characteristics of the device itself. On the whole, both the mobile and digital games industries have much broader demographic ranges that no doubt intersect. The popularity of both digital games and mobile phones presents a strong opportunity to drawing divergent segments from both industries into the convergence. The full range of potential users deserves consideration in planning the rollout of wireless entertainment services.

### USER MODELS

A concomitant task in determining who will use a new technology is assessment of how, when, and where it will be employed. The following analysis posits four user models, including demographic, behavioral, geographic, and cultural considerations. In reviewing these models, it is important to note that limitations in battery life and the trade-off in usage of telephony and other wireless applications dictate a maximum usage pattern.

**Teens.** There is little question that teenagers are the group with the greatest amount of free time. They are definitely inured to gaming on other platforms, and also exhibit veritable obsession with fashion, friends, and entertainment. Teens have sophisticated tastes and an intense desire to acquire the latest innovations, setting trends that contribute heavily to general consumer awareness of various products. They will likely use wireless games en route to school or friends' houses, though games will compete with telephony due to this group's tendency to engage in frequent, extended discussions with one another, nearly 12 hours a week for those in their mid-teens. They may also be prone to playing games in class or in other environments where the ambient level of stimulation does not meet their requirements. They are likely to increase playtime in response to incentives such as prizes, will quickly abandon unchallenging games, and will not tolerate service delivery faults. Parents subsidize mobile use for a majority of teen users, so gaming-related charges will accrue without much concern on the part of this group, at least for those whose parents fail to implement stringent boundaries concerning cost. The most promising aspect of this group is their generally enthusiastic attitude toward new technologies, especially when related to entertainment and communications.

**Generation Y.** Many young adults, especially the important consumer segment comprised of college students, will adopt wireless gaming not only because of the strong

presence of digital games throughout their lives, but because the importance of brand identity to them dictates the need to acquire the latest and most innovative consumer products and services. This segment will probably play frequently in short bursts while in transit, as well as using telephony and information services to find the most "happening" restaurants and clubs. Extensive play is likely to occur with regard to the most compelling games. The busy social and professional lives of this active group will generate numerous periods of "dead time". Other applications of interest for this group are telephony and messaging services. The value of targeting this market segment is their propensity to consume and increase the visibility of products perceived as novel and interesting as well as the fact that they are making brand decisions that may exert lasting influence. This group shares an enthusiastic attitude toward entertainment and communications technologies with their younger counterparts.

**Generation X.** Adults in their late twenties and early thirties grew up with the first video games, spearheading the popularity of console gaming and later acting as pioneers of the Internet's entertainment potential. This is "Generation X", or the "Internet cohort", among whom the cultural shift toward shorter attention spans and demand for high levels of stimulation was seeded. This group has now come of age and still share many recreational interests with their younger counterparts, including gaming. They represent the oldest group of adults whose personalities and tastes were shaped in part by similar marketing and technological influences as their younger counterparts. They will probably adapt to wireless gaming as they have adapted to numerous other gaming platforms over the course of many years. These users may use palmtop computers and other alternatives to mobile handsets for playing mobile games. They will also utilize information and other entertainment services while in transit, waiting for appointments or meals, standing in queues, and any other time their concentration is not required elsewhere. Significant consumption of mobile games can be expected when the quality of mobile gaming improves. The rudimentary quality of current wireless gaming may inspire nostalgic amusement for a short time, but will not satisfy these seasoned gamers for long, if at all. Extensive time and cost investment will most likely occur with regard to specific games that satisfy their expectations. These users exhibit discerning attitudes toward emerging technologies, but are enthusiastic about innovations that truly enhance their productivity or entertainment needs.

**Corporate.** 35+ corporate users who did not grow up with digital games may resort to gaming when traveling. Although their approach may be more casual than other groups, frequent and often-extended travel required by their jobs could result in significant usage. These users will perhaps be somewhat more self-conscious and less adaptive than other groups, but are also likely to be the most accepting of rudimentary games if they overcome interface difficulties. These users may be most attracted to simple casino games, gambling applications, or what Digital Bridges terms "mass-market" games. Employers generally pay wireless bills for business users, so restraint of consumption on the basis of cost is unlikely. However, mobile gaming applications will face significant competition from telephony and productivity-enhancing services. This group will take the

longest time to acclimate to mobile gaming simply because they are not as well adapted to digital gaming as their younger counterparts, but may generate significant revenue once the industry is well-established.

## **SUMMARY**

The preceding analysis clearly delineates the existence of a heterogeneous audience for mobile gaming. Their usage patterns will vary, with frequent-but-brief interactions representing the most common pattern. Obviously, individual lives and personalities are far more complex than these general user profiles. Moreover, not every user will fall into one of these categories. However, the remarkably high penetration of digital gaming technologies and mobile phones within these groups increases the probability of their adopting mobile gaming as a source of entertainment, primarily using it as a weapon against boredom while in transit. Inferences drawn from investigation of the digital gaming market and behavior of wireless users are useful in developing design and marketing strategies. The industry would benefit from large-scale, incisive market research to more accurately determine the characteristics of potential consumers for wireless games in specific regions.

From a marketing standpoint, targeting teens is key to driving the initial uptake of wireless gaming. The specific characteristics of the youth market suggest that younger people will be the first to adopt the new technology. Marketing schemes aimed at kids initiated the recent upsurge in popularity of all video games, but are now targeting older users as well for their superior financial resources and avid uptake of game products. Understanding the gaming industry's users offers excellent insight into the potential audience and target markets for mobile gaming.

## **GAMES ANALYSIS**

This section investigates why consumers like games and delineates the elements of a compelling digital game in order to provide a basis for analyzing the design quality of existing mobile games and emphasize qualitative factors contributing to the commercial potential of mobile games. Gaming genres associated with established platforms are briefly reviewed and analyzed for mobile gaming potential. This is followed by reviews of numerous existing mobile games, including critical analysis of their quality with regard to elementary principles and market potential.

The undeniable fact is that digital games are revolutionizing entertainment. The interactive nature of games allows players to experience virtual worlds far more exciting than everyday life or the short-lived vicarious experiences of passive entertainment forms. The best-selling games empower players through the creation of identities and experimental discovery of their diverse behaviors and abilities. Creative decision-making

results in immediate gratification or anticlimax, in either case compelling players to play again in order to exceed previous successes or improve upon losses.

### ENTERTAINMENT VALUE

The perspective of active gamers outlines their conscious motivations for playing and provides clues as to why they find gaming so appealing. Although motivations for gaming on the go are examined in the previous section, further explanation of reasons people play games so avidly is needed as a foundation for understanding their appeal. Asked why they play digital games, respondents to the IDSA's Annual Consumer Survey gave four main reasons, given below along with the percentage of respondents citing them.

TOP REASONS CONSUMERS LIKE TO PLAY GAMES	
1. Challenge	78.4%
2. Stress relief	55.1%
3. High entertainment value for money	48.9%
4. Social activity	37.4%

Source: IDSA

The elements of challenge and social interaction distinguish gaming from more passive forms of entertainment. This is exemplified by the fact that the Hollywood film industry has attempted to translate the appeal of gaming to the big screen without much success, whereas numerous games derived from popular movies have enjoyed massive success.

### POPULAR GENRES AND MOBILE POTENTIAL

Personal preference and gaming style also contribute to choice of games. The difference between hardcore and casual gamers can be correlated with categorical choices, although some gamers (including the author) enjoy a wide variety of games to satisfy different intellectual and visceral needs. Hardcore gamers generally seek the most sophisticated games and comprise the consumer group buying and playing the most games. Part of the reason mobile games developers must take full advantage of the limited platform is because realizing the potential of this industry depends on drawing in hardcore gamers who seek gaming challenges most often and most addictively. Casual gamers, in contrast, just want a little break from their daily activities and tend to play simpler, classic applications that are easy to play and not as immersive in nature. According to IDSA's consumer survey, the preferences of PC/online gamers differ somewhat from those of console gamers. The most popular game genres are presented in rank order below along with the percentage of respondents who play them most often.

PC/ONLINE GAMES	
1. Action	25%
2. Puzzle/board/card	24%
3. Sports	19%
4. Driving/racing	17%

CONSOLE GAMES	
1. Action	36%
2. Driving/racing	29%
3. Sports	28%
4. Role playing/adventure	17%

Source: IDSA

Although it ranks last among console game categories, the single best selling genre last year was role playing/adventure games (RPGs), comprising 21.35% of units sold according to IDSA. These games are generally the domain of hardcore console gamers, since they require greater cognitive processing and time than most casual gamers are willing to invest. This is one of the main genres that have advanced the digital games market in recent years. Enormous improvements in presentation quality and programming capabilities have yielded games that allow players more creative and strategic control than ever before. Current mobile RPGs are generally linear in format and not visually engaging, though possibilities for allowing players to develop quite complex characters and interact with other players in virtual worlds more extensively without having a load of text heaped on them and few options that merely drive them in a unidirectional manner certainly exist. This is definitely an area where the most creative mobile games designers and developers can differentiate their games right now, by maximizing multiplayer elements in such a way that the users almost create their own game within a compelling framework. Cash-U's role-playing games, which unfortunately were unavailable for review, allow subscribers to assume character roles engaging in a wide spectrum of scenarios. They may define character attributes as well as developing possible actions and interactions between characters. Cash-U believe this type of structure promotes competition between "world creators" and drives development of more innovative games.

Many compelling game innovations to role playing/adventure games have emerged as a result of players modifying game code. Certain "mods" have met with smashing success as commercial add-ons, so getting mobile games development tools into the hands of gamers could result in significant innovation for the platform. IDSA believes that providing interested consumers with access to development tools "ensures the continued diversification of game form and content". The emergence of Nokia's Entertainment Developer's Program (<http://www.nokia.com/wap/developers.html>) including development tools available free of charge should begin inspiring consumers to develop their own applications if the industry can generate enough interest in the platform.

The next best-selling genre is action games, which topped the preference list for both PC/online and console gamers and comprised 17.42% of units sold. Stimulating action games appeal to both hardcore and casual gamers. One limitation of the mobile games market is that effective implementation of action games is extremely difficult in the current environment, with the exception of embedded applications. The presence of

mobile action games that require several steps in order to execute a move and latency in receiving results simply isn't compelling enough to maximize the potential of this genre, although certain games such as Jamdat's *Gladiator* (reviewed later in this section) have become fairly popular. At present, the most substantial opportunity for mobile success in this genre involves embedded games that exploit the processing power and display capabilities of mobile devices.

Sports games, which rank third in preference for both PC/online and console gamers, are the third best-selling type of game, generating 14.95% of unit sales in 2000. The sports of choice for gamers include football (called soccer only in North America), basketball, baseball, US football, and ice hockey (martial arts games are generally classed under the "action" category). With stunning improvements in graphics, including the use of motion capture technology to realistically model the actions of professional players, and remarkable extension of player control, sports games have really flourished over the past few years. In terms of mobile applications, the same restrictions mentioned for action games apply. However, sports *management* games, wherein players form teams and leagues that engage in virtual competition according to the statistical probabilities generated by the particular talents of each player's team, are very possible as networked (community-based) mobile games. This type of game could inspire many players to check in daily for scores and rankings, making trades and other strategic decisions as necessary. In this case, there is not as much loss in satisfaction due to poor visual or interactive features because the games are more strategic than visceral in nature.

Driving/racing games, ranked fourth and second respectively in the preferences of PC/online and console gamers, represent 10.08% of unit sales in 2000. Again, the current environment for mobile games cannot generate adequate applications for this type of game. Enjoyment depends largely on the presence of realistic, fast-moving graphics that come as close to simulating the experience of racing a premium vehicle around hairpin curves against aggressive competitors. An i-mode game called *Grand Prix* attracted thousands of players, apparently offering choices of car and track and including networked capacity for competition against others. However, i-mode's mobile environment is more efficient and colorful than Western WAP implementations. Once technological improvements facilitate a richer interaction, racing games that maximize visual presentation capabilities and integrate the appeal of multiplayer networked gaming will probably meet with success.

Puzzle/board/card games rank second in preferences of online gamers and not at all in the domain of console players. Unfortunately, their sales percentages are indistinguishable within the IDSA report because they are lumped into the vaguely defined category "all other games". While all mobile games currently fail to deliver the technical sophistication enthusiasts enjoy on other platforms, the simple, addictive games people have played for eons in non-electronic form continue to thrive in Web application form and are relatively easy to develop for mobile. This is evident in the fact that such games are most prevalent in the catalogs of current mobile games companies.

Clearly, game play of this nature can be challenging enough to stimulate the interest of at least casual users.

However, many existing mobile games in this category are marginal in design quality and so unoriginal that they hardly contribute to differentiation between different companies' offerings. According to Datamonitor, classic card, quiz, and bingo games will be the most popular games on mobile phones. This author respectfully disagrees with their assertion and questions whether it is based on the fact that most offerings to date fall into these categories. Puzzle/board/card games will only dominate if companies continue churning out almost nothing else, or if their more complex games are rife with usability problems that deter users. These games will not maximize the market potential of mobile games, as the hardcore gamers who spend the most time and money on games will continue playing Game Boy Advance or waiting until they get home to start gaming rather than play classic games they consider stale and boring or poor manifestations of games within their preferred genres.

#### **ELEMENTS OF EFFECTIVE GAMES**

The following analysis extracts the elements imbuing games with value to their players, independent of stylistic or brand preferences. These elements are considered the foundations of successful games across all platforms and provide a means for evaluating specific games by drawing attention to each separately rather than simply assessing their commercial success.

**1. Concept.** The concept is defined as the elements of the interactive experience that initially engage the user's attention and interest. The diverse preferences of users attract them to different types of games. Although certain themes dominate the market, some of which are based on ancient or contemporary classic gaming concepts, originality of concepts within popular thematic categories or new variations of previously successful concepts differentiates the most appealing digital games. As related technologies advance, many digital games are becoming increasingly immersive, evoking emotional reactions on the basis of interaction with realistic characters. This sophisticated conceptual approach utilizes players' understanding of human behavioral dynamics, engaging players in a more profound manner than ever before.

**2. Challenge.** Fundamental to inspiring repeat play is the level of challenge a game offers. Players must make decisions in order to outwit the application itself, or better yet one or more human opponents, whether in the context of a rapid, visceral interaction or a slower, more strategic one. In some cases, this is achieved with algorithms that create a new interaction for each game such that increase in winning percentage occurs as players' skills evolve. Even more effective are games that incrementally increase the level of challenge such that the game itself evolves in concert with the skills of each gamer. Multiplayer games are burgeoning in popularity because the level of challenge increases with the availability of numerous opponents. This activates and magnifies the

fundamental human motivation to win, a modern-day manifestation of the evolutionary principle “survival of the fittest”.

**3. Usability.** This element represents the ease with which gamers can execute their part of the interaction. This includes both device and application usability issues discussed previously, though the focus in this section is the applications themselves. An engaging concept and evolving challenges are useless if the gamer cannot learn the procedural aspects of game play relatively easily in order to control the interaction. This is why developers of every type of software are coming to realize the value of HCI specialists who analyze the architectural, interactive, and presentation elements of applications to ensure that management and developer visions become commercially successful products with their heightened understanding of the user experience, utilizing a much more multi-disciplinary approach than people whose duties are business or programming-related can reasonably be expected to adopt or fully understand.

**4. Presentation.** The fourth element is presentation. Albeit superficial, presentation is integral to the effectiveness of a game. Visual presentation, including from choice of colors to graphical style and audio elements to a great extent determine the degree to which the concept and interaction design set the tone of a game. Presentation elements exert a critical effect on a game’s ability to elicit the desired reactions and long-term interest. Games designers must understand the constraints of the medium and develop creative techniques for maximizing presentation quality.

#### **SUMMARY**

Digital games provide compelling interactive entertainment, but producing games of the highest quality requires sufficient attention to factors relevant to the domain’s evolution. User motivations and usage patterns are relevant to understanding the role of digital games in their lives. Awareness of the relative popularity of various genres and new trends is informative, but offerings that superficially match popular genres are not necessarily destined for commercial success. Identifying and understanding the elements of effective games adds a more substantive perspective concerning digital games design and evaluation. Successful games optimize most or all of the four features described, while failed games usually containing glaring weaknesses in one or more areas, as exemplified in the reviews of 50 existing mobile games.

## **CONCLUSIONS**

The increasing sophistication of wireless technologies is enabling a revolutionary paradigm shift in communications as momentous as the emergence of the wired Internet, opening new avenues digital communications that seemed stuck in the realm of science fiction not so long ago. Wireless evolution is a global phenomenon transcending cultural and economic boundaries by providing a relatively inexpensive device that links its owner



to an increasingly diverse set of data communications and service possibilities. However, the principles of disruptive technologies and sheer complexity of relationships between entities in the value chain in this instance has generated a number of obstacles and dilemmas, some of which are obvious and others that strategists cannot identify or cope with because they lie outside the context familiar business models. The technologies are evolving in theory, but the reality of implementation requires steep capital outlays and potentially devastating periods of sub-optimal performance that call into question whether consumers will even want the services. The pace of technological change and relatively primitive programming and deployment environments fundamentally limit the quality and potential revenue for nonvoice wireless services, although the simplest data service of all, SMS, has generated ample revenue. The key to unlocking the market potential of more sophisticated services is to identify the most commercially valuable and learn how to master the wireless medium at every stage of its stepwise evolution in order to optimize those services for consumers.

This whitepaper has a related Internet site at <http://www.games4mobile.com> to keep readers up-to-date with the latest developments in the realm of mobile communications in general and mobile gaming in particular. All comments, clarifications, and discussions regarding the contents of this report in particular or nonvoice mobile in general are welcomed by Mobile Streams. Email [gaming@mobileStreams.com](mailto:gaming@mobileStreams.com)

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**Next Messaging: From SMS to EMS to MMS – Simon Buckingham**  
**Published: December 2000 (275 pages)**

Messaging is evolving beyond text to enhanced text and simple pictures to full multimedia messages. This report plots this evolution path and is an essential resource for those working with SMS who are looking to maintain their position in the future. The transition from text messaging to multimedia messaging is as important for mobile phones as the transition from DOS to Windows was for the PC.

**For more information visit: <http://www.NextMessaging.com>**

**Price: 495\$US**

**ISBN: 1929105290**

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**Success 4 GPRS – Simon Buckingham**  
**Published: August 2001 (255 pages)**

Just how important is GPRS? This new comprehensive report will tell you all that you need to know.

**For more information visit: <http://www.mobileGPRS.com>**

**Price: 495\$US**

**ISBN: 1929105258**

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**Yes 2 Prepay – Gerald T. Christensen**  
**Published: August 2000 (175 A4 pages)**

Written by Mobile Streams' Prepaid expert, Gerry Christensen, this 131 page report has been designed to help product and service providers and those investing in systems/solutions to make more informed business decisions.

**For more information visit: <http://www.mobilePREPAY.com>**

**Price: 495\$US**

**ISBN: 192910541X**

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**Success 4 WAP – Simon Buckingham**  
**Published: February 2001 (200 pages)**

The Wireless Application Protocol (WAP) is a hot topic that has been widely hyped in the mobile industry and outside of it. Mobile Streams originally produced its first WAP book, "Data on WAP", in July 1999. Due to rapid changes and developments this book was reissued as "Yes 2 WAP" in May 2000 and as "Success 4 WAP" in February 2001.

**For more information visit: <http://www.yes2WAP.com>**  
**Price: 495\$US**  
**ISBN: 1929105355**

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**YES 2 3G – Simon Buckingham**  
**Published: February 2001 (283 pages)**

"YES 2 3G" presents an optimistic look at tremendously exciting possibilities that Third Generation/ UMTS technologies and applications enable. Timescales, profiles of all the major infrastructure vendors including the Japanese vendors, every mobile multimedia application, "At home with your futurephone"- mobile communications in the next few years, 3G Talking Points, all the 3G contracts awarded, the standards, handset alliances and partnership opportunities and much, much more are included in this report.

**For more information visit: <http://www.mobile3G.com>**  
**Price: 495\$US**  
**ISBN: 1929105339**

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**Mobile Positioning – Stephen M Dye and Dr Frank Baylin**  
**Published: April 2001 (273 pages)**

"Mobile Positioning" is a book about mobile positioning systems- in particular, the Global Positioning System (GPS), non-GPS location techniques and Cell Broadcast. Although the book focuses primarily on the Global Positioning System (GPS), appendixes cover other non-GPS location schemes and Cell Broadcast in considerable detail.

**For more information visit: <http://www.MobilePositioning.com>**  
**Price: 495\$US**

**ISBN: 1929105398**

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**Messaging Metrics – Simon Buckingham**

**Published: March 2001 (127 pages)**

The intention of this report, "Messaging Metrics", is to satisfy the large number of requests that Mobile Streams receives from its customers such as infrastructure vendors, investment banks, research companies, journalists and the like for detailed quantitative and qualitative information on the growth of mobile messaging services such as text messaging (SMS), enhanced messaging (EMS) and multimedia messaging (MMS).

**For more information visit: <http://www.mobileSMS.com>**

**Price: 495\$US**

**ISBN: 1929105371**

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**SMS Tech – Simon Buckingham**

**Published: July 2001 (199 pages)**

"SMS Tech" is a report supporting the wide array of SMS related technologies and services that have been developed, particularly as application developers and operators alike have refocused WAP investments in SMS. Everyone wants help developing SMS applications and deploying them. "SMS Tech" covers all of these and many other issues in detail. It presents a roadmap for continued SMS success over the next couple of years.

**For more information visit: <http://www.mobileSMS.com>**

**Price: 495\$US**

**ISBN: 1929105495**

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**SMS Express – Simon Buckingham**  
**Published: July 2001 (228 pages)**

This report is intended to show the how to maximize the use of, and therefore the revenue from, the Short Message Service. "SMS Express" covers the marketing and commercial aspects of SMS and as such is aimed at product managers, content providers, service providers and the like.

**For more information visit: <http://www.mobileSMS.com>**  
**Price: 495\$US**  
**ISBN: 1929105479**

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**Data on Bluetooth – Simon Duncan**  
**Published: July 2001 (207 pages)**

Data on Bluetooth is the first report of its kind aimed at helping those implementing and deploying Bluetooth applications, services and products to gain the maximum business benefit from the technology. It aims to help with Bluetooth-related investment decisions by providing a clearer picture of the extent to which Bluetooth is in a position to deliver on its promises and the ways in which its potential can best be exploited.

**For more information visit: <http://www.mobilebluetooth.com>**  
**Price: 495\$US**  
**ISBN: 1929105452**

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NOTE: To order any of the above publications, please visit our secure online ordering form at <https://www.mobilesms.com/ordering.asp>

## LINKS TO RELATED INTERNET SITES

Mobile Streams operates more than 120 different websites relating to mobile data. The sites include:

Mobile Streams currently owns and operates the following live websites:

[www.mobile3G.com](http://www.mobile3G.com)

All about the third generation of mobile phones- offering mobile multimedia.

[www.mobile4G.com](http://www.mobile4G.com)

Fourth Generation Mobile Virtual Reality!

[www.mobiledatashop.com](http://www.mobiledatashop.com)

Buy mobile data hardware and software from this one stop mobile data shop.

[www.mobileDRM.com](http://www.mobileDRM.com)

Digital Rights Management- content copyright control over mobile networks, an essential enabler in 3G mobile phones

[www.mobileEMS.com](http://www.mobileEMS.com)

The ability to send a combination of simple melodies, pictures, sounds, animations, modified text and standard text as an integrated message for display on an EMS compliant mobile phone.

[www.mobileFirst.com](http://www.mobileFirst.com)

Your on ramp to the mobile Internet with news, personalization, community, interactivity, search.

[www.mobileGPRS.com](http://www.mobileGPRS.com)

All about the General Packet Radio Service.

[www.mobileInsiders.com](http://www.mobileInsiders.com)

The Insiders Programme- Mobile Streams Platinum customer package

[www.mobileIPOs.com](http://www.mobileIPOs.com)

Track the mobile Initial Public Offerings that are taking place in 2001 around the world with our extensive analysis

[www.mobilelatestnews.com](http://www.mobilelatestnews.com)

The latest strategic News by Mobile Streams

[www.mobileMMS.com](http://www.mobileMMS.com)

All about Multimedia Messaging

[www.mobilePatents.com](http://www.mobilePatents.com)

A database tracking patents awarded to mobile companies and news about patent disputes

[www.mobileScreenSavers.com](http://www.mobileScreenSavers.com)

Screensavers for your mobile phone!

[www.mobileSMS.com](http://www.mobileSMS.com)

All about the Short Message Service.

[www.mobileStreams.com](http://www.mobileStreams.com)

Our company's corporate website with all the information about our people, products and partners

[www.mobileViruses.com](http://www.mobileViruses.com)

Virus Protection on mobile phones and devices

[www.mobileVMS.com](http://www.mobileVMS.com)

Voice Mail Systems

[www.mobileVoiceXML.com](http://www.mobileVoiceXML.com)

Voice XML

[www.mobilewap.com](http://www.mobilewap.com)

The ultimate WAP search engine.

[www.nextmessaging.com](http://www.nextmessaging.com)

All about SMS, EMS and MMS messaging

[www.operatorlogos.com](http://www.operatorlogos.com)

Operator Logos for Nokia Phones

[www.picturemessaging.com](http://www.picturemessaging.com)

Send simple images between mobile phones! A picture paints a thousand words so test out the next generation of mobile messaging!

[www.ringtones.com](http://www.ringtones.com)

Change the way your phone rings. Turn your phone into a personal jukebox!

[www.wirelessClueless.com](http://www.wirelessClueless.com)

Your reality check on the rhetoric that surrounds the mobile Internet

[www.yes2wap.coM](http://www.yes2wap.coM)

All about the Wireless Application Protocol ( WAP )

[www.directspread.com](http://www.directspread.com)

About the direct spread 3G airlink!

[www.email4mobiles.com](http://www.email4mobiles.com)

Email on your mobile phones

[www.FutureFoneZone.com](http://www.FutureFoneZone.com)

All about the next five years of mobile phones. View the exclusive photo gallery of 3G concept phones.

[www.Games4mobile.com](http://www.Games4mobile.com)

All about games for mobile phones. Traditionally game playing has been tethered to the television or the PC, but increasingly gaming is getting mobile.



[www.links2mobile.com](http://www.links2mobile.com)

Links 2 thousands of mobile sites

[www.mobile2home.com](http://www.mobile2home.com)

Remote access to your home from your mobile phone!

[www.mobile3GSM.com](http://www.mobile3GSM.com)

Live news feeds from the 3GSM World Congress in Cannes

[www.mobile4mobile.com](http://www.mobile4mobile.com)

The website for mobile comms professionals- workshops, conferences, reports, jobs- its all here

[www.mobileamericanews.com](http://www.mobileamericanews.com)

The website to visit for the latest news on the American mobile market

[www.mobileasianews.com](http://www.mobileasianews.com)

All about mobile communications news in Asia

[www.mobileAus.com](http://www.mobileAus.com)

Mobile News from Australia

[www.mobileBilly.com](http://www.mobileBilly.com)

Mobile billing systems

[www.mobileBluetooth.com](http://www.mobileBluetooth.com)

All about Bluetooth, a short area network standard.

[www.mobileCAMEL.com](http://www.mobileCAMEL.com)

Customized Application for Mobile Enhanced Logic

[www.mobilecasestudies.com](http://www.mobilecasestudies.com)

Every month a new case study from a mobile network operator

[www.mobileCDMA.com](http://www.mobileCDMA.com)

All about the CDMA mobile networks popular in the USA and Korea.

[www.mobileCebit.com](http://www.mobileCebit.com)

Hot news from the CeBIT show

[www.mobilecellbroadcast.com](http://www.mobilecellbroadcast.com)

All about Cell Broadcast, a means to broadcast the same message to customers with a mobile phone in certain areas

[www.mobileChatting.com](http://www.mobileChatting.com)

Chat and community services on mobile phones

[www.mobileChinaNews.com](http://www.mobileChinaNews.com)

News from the Chinese mobile market

[www.mobileChtml.com](http://www.mobileChtml.com)

All about Compact HTML, the protocol used by i-mode in Japan

[www.MobileConferences.com](http://www.MobileConferences.com)

All about mobile communications conferences being held around the world.

[www.mobileConn.com](http://www.mobileConn.com)

All about mobile network Connectivity

[www.mobileconsultancy.com](http://www.mobileconsultancy.com)

About mobile communications consulting companies

[www.mobileContentWorld.com](http://www.mobileContentWorld.com)

Content is king- read all about the mobile content industry here

[www.mobileCorporateEmail.com](http://www.mobileCorporateEmail.com)

Send and receive email from your corporate email account on your mobile phone/ device

[www.mobileCorporations.com](http://www.mobileCorporations.com)

All about mobile deployments in corporations

[www.mobileCSD.com](http://www.mobileCSD.com)

All about Circuit Switched Data

[www.mobileCustCare.com](http://www.mobileCustCare.com)

Using mobile phones to provide customer care

[www.mobileDataEvolution.com](http://www.mobileDataEvolution.com)

Understand the evolution paths for GSM, TDMA and CDMA

[www.mobileddevelopers.com](http://www.mobileddevelopers.com)

Your mobile application development community covering all technologies from SMS to WAP to GPRS to 3G

[www.mobileDiscuss.com](http://www.mobileDiscuss.com)

Interactive discussion on mobile topics such as SMS, WAP, GPRS, 3G etc.

[www.mobileDispatches.com](http://www.mobileDispatches.com)

All about Mobile Streams' monthly series of white papers about mobile communications services.

[www.mobileEagents.com](http://www.mobileEagents.com)

Mobile Electronic Agents

[www.mobileEIR.com](http://www.mobileEIR.com)

All about Equipment Identity Registers

[www.mobileEnablers.com](http://www.mobileEnablers.com)

Embedded Handset Enablers e.g. PKI, DRM etc.

[www.mobileEnhancedData.com](http://www.mobileEnhancedData.com)

All about Enhanced Data Rates for Global Evolution (2.75G or EDGE)

[www.mobileExhibitions.com](http://www.mobileExhibitions.com)

Exhibitions in the mobile communications industry

[www.mobileFaxmail.com](http://www.mobileFaxmail.com)

Mobile Faxmail services

[www.mobileFiletransfer.com](http://www.mobileFiletransfer.com)

Transferring files over mobile networks

[www.mobileFinlandNews.com](http://www.mobileFinlandNews.com)

Hot stories from a hot mobile market

[www.mobileGPS.net](http://www.mobileGPS.net)

All about the Global Positioning System (GPS)

[www.mobileHSCSD.com](http://www.mobileHSCSD.com)

High Speed Circuit Switched Data

[www.mobileimode.com](http://www.mobileimode.com)

i-mode the NTT DoCoMo Japanese mobile Internet phenomenon

[www.mobileInstantMessages.com](http://www.mobileInstantMessages.com)

All about accessing instant messaging on mobile phones

[www.mobileIPworld.com](http://www.mobileIPworld.com)

The increasing use of the Internet Protocol (IP) in the mobile world

[www.mobileIVR.com](http://www.mobileIVR.com)

All about Interactive Voice Response (IVR)

[www.mobileJargonBuster.com](http://www.mobileJargonBuster.com)

Your guide through the mobile acronym jungle!

[www.mobileJobdispatch.com](http://www.mobileJobdispatch.com)

Dispatching jobs to mobile workers

[www.mobilejoblinks.com](http://www.mobilejoblinks.com)

All about recruitment services for the mobile industry.

[www.mobileJP.com](http://www.mobileJP.com)

News from the Japanese mobile market

[www.mobileMags.com](http://www.mobileMags.com)

Magazines and newsletters about mobile communications

[www.mobileMarkups.com](http://www.mobileMarkups.com)

Mobile Markup Languages

[www.mobileMcommerce.com](http://www.mobileMcommerce.com)

All about Mobile Commerce.

[www.mobileMExE.com](http://www.mobileMExE.com)

All about the Mobile Station Application Execution Environment.

[www.mobileMiddleware.com](http://www.mobileMiddleware.com)

All about developing mobile applications more quickly and easily!

[www.mobileMMD.com](http://www.mobileMMD.com)

All about downloading music onto your mobile phone!

[www.mobileMMI.com](http://www.mobileMMI.com)

All about user interfaces and the Man Machine Interface (MMI)

[www.mobilenewsletters.com](http://www.mobilenewsletters.com)

All about newsletters for the mobile communications industry.

[www.mobileOSA.com](http://www.mobileOSA.com)

All about Open Services Access (OSA)

[www.mobileOutsourcing.com](http://www.mobileOutsourcing.com)

All about outsourcing mobile platforms!

[www.mobilepacket.com](http://www.mobilepacket.com)

How to make a Packet out of Mobile Packet!

[www.mobilePKI.com](http://www.mobilePKI.com)

Public Key Infrastructure for mobile networks

[www.mobilePlanners.com](http://www.mobilePlanners.com)

Mobile network planning

[www.mobilePortalWorld.com](http://www.mobilePortalWorld.com)

All about mobile portals

[www.mobilePositioning.com](http://www.mobilePositioning.com)

All about GPS and non GPS positioning system technologies and applications.

[www.mobilePrepay.com](http://www.mobilePrepay.com)

All about prepayment- a form of paying for mobile phone service in advance of using it.

[www.mobilePressReleases.com](http://www.mobilePressReleases.com)

Press Releases

[www.mobilepublications.com](http://www.mobilepublications.com)

All about publications for the mobile phone professional.

[www.mobileRemoteLANaccess.com](http://www.mobileRemoteLANaccess.com)

Remote Access to Local Area Networks

[www.mobileRetailers.com](http://www.mobileRetailers.com)

Selling mobile phones and equipment over the Internet

[www.mobileRoamers.com](http://www.mobileRoamers.com)

Taking your mobile phone overseas

[www.mobileServiceEng.com](http://www.mobileServiceEng.com)

Field service engineers using mobile networks

[www.mobileSIMtoolkit.com](http://www.mobileSIMtoolkit.com)

All about SIM Application Toolkit!

[www.mobiles7.net](http://www.mobiles7.net)

All about Signaling System number Seven (SS7)

[www.mobileSuppliers.com](http://www.mobileSuppliers.com)

Who is supplying whom with what for key technologies

[www.mobileSyncML.com](http://www.mobileSyncML.com)

The SyncML synchronization standard

[www.mobileSysInt.com](http://www.mobileSysInt.com)

Systems Integrators who will make corporate data available over mobile networks

[www.mobiletelemetry.com](http://www.mobiletelemetry.com)

All about Telemetry.

[www.mobileTesters.com](http://www.mobileTesters.com)

Testing network coverage

[www.mobileThirst.com](http://www.mobileThirst.com)

The thirst quencher for your mobile phone- all the mobile services you could ever need on one website....

[www.mobileUMTS.com](http://www.mobileUMTS.com)

All about the Universal Mobile Telephone System!

[www.mobileUsim.com](http://www.mobileUsim.com)

3G Smart Cards

[www.mobileUSSD.com](http://www.mobileUSSD.com)

All about the Unstructured Supplementary Services Data.

[www.mobileValueChains.com](http://www.mobileValueChains.com)

End to end delivery of mobile services

[www.mobileVentureCap.com](http://www.mobileVentureCap.com)

VC investments in the mobile industry

[www.mobileVHE.com](http://www.mobileVHE.com)

All about the Virtual Home Environment

[www.mobilevideoworld.com](http://www.mobilevideoworld.com)

All about video services on mobile phones

[www.mobileVNOs.com](http://www.mobileVNOs.com)

Mobile Virtual Network Operators

[www.mobilevoiceportal.com](http://www.mobilevoiceportal.com)

Voice driven mobile portals

[www.mobileVOIP.com](http://www.mobileVOIP.com)

All about using mobile networks to transmit voice over IP (VOIP)

[www.mobileWcdma.com](http://www.mobileWcdma.com)

Wideband CDMA

[www.mobileWebBrowsing.com](http://www.mobileWebBrowsing.com)

Access the Internet on your mobile phone

[www.mobilewebtone.com](http://www.mobilewebtone.com)

The Internet equivalent to today's dial tone.

[www.mobilewhitepapers.com](http://www.mobilewhitepapers.com)

All about Mobile Streams FREE White Papers.

[www.mobileworking.com](http://www.mobileworking.com)

Using mobile communications to change the way you work

[www.mobileworkshops.com](http://www.mobileworkshops.com)

Workshops about mobile communications



[www.mobileXhtml.com](http://www.mobileXhtml.com)

eXtensible HTML on mobile phones

[www.mobileYearly.com](http://www.mobileYearly.com)

Mobile Streams' predictions for the year ahead

[www.nonvoice4novices.com](http://www.nonvoice4novices.com)

All about the mobile data revolution.

[www.nonvoicenews.com](http://www.nonvoicenews.com)

About mobile Streams' monthly newsletter, Nonvoice News

[www.unifiedmobile.com](http://www.unifiedmobile.com)

All about mobile unified messaging

[www.vehiclepositioning.com](http://www.vehiclepositioning.com)

All about Automatic Vehicle Location.