Market Intelligence Report
Online Entertainment and Leisure

An initial study of the market for Online Entertainment and Leisure, defined as:
"The market for online delivery of digital entertainment and leisure services to end consumers, specifically the delivery of music, games, movie and gambling services over fixed and wireless networks and the personalisation of mobile phones (ringtones and infotainment content)"

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CONTENTS

EXECUTIVE SUMMARY

The Online Entertainment and Leisure (OE&L) Sector has been analysed, and the findings presented in this Report.

Online entertainment and leisure covers a broad market sector, ranging from mobile through to fixed line broadband network-based services. For the purposes of this document, the definition of online entertainment and leisure is:

> *"The market for online delivery of digital entertainment and leisure services to end consumers. specifically the delivery of music, games, movie and gambling services over fixed and wireless networks and the personalisation of mobile phones (ringtones and infotainment content)"*

This Report also covers, where relevant, applications and platforms which enable such services to be delivered effectively to the end consumer.

The Report describes the results of the first stage of the ITI market foresighting process. As such, it describes the future market opportunities, challenges, key drivers and the potential technologies in the online Entertainment and Leisure sector.

Using this acquired knowledge as the base input, the ITI will select those functional needs that have strongest potential market 'fit', and the greatest potential to be a success when utilised within the identified target markets. The functional needs will be used to define potential technology platforms which will then be used as input to ITI Techmedia's programme selection process.

During this process, ITI Techmedia will continue to report to its Membership on progress and results. Members are encouraged to provide comment and input to this process, and to become actively involved in programmes.

ITI Techmedia intends to further develop its knowledge base in this sector. In order that the Membership gain visibility of ongoing developments identified by ITI Techmedia, this Report will be subject to periodic review and re-issue.

Online Entertainment and Leisure represents 5% of the total entertainment and leisure market

The total market for filmed entertainment (film, video and DVD), recorded music and games across all formats has been valued at USD128 billion in 2003 and is forecast to grow by 9% per annum on average in the period from 2003 to 2008.[1] The combined online revenue for movies, music and games is calculated at USD6.1 billion in 2003[2] which represents less than 5% of the total movies, recorded music and games market. By 2008, however, online is forecast to account for 13% of the total movies, recorded music and games market.

[1] PwC
[2] RHK, Juniper

The Online Entertainment and Leisure Sector exhibits a number of key trends

The OE&L sector exhibits a number of key trends, including:

- Increased personalisation of content to meet consumer needs, with location-based information and context-related data of high importance.
- Increased availability and uptake of broadband connections.
- Home networking will grow in importance as consumers increasingly expect to be connected and "always on" wherever they are in the home. Seamless connectivity between various devices (fixed and mobile) and between mobile (GSM), WiFi and Broadband will be crucial to enabling home networking and will drive the uptake of new applications and services.
- Mobile and home devices will become more seamlessly integrated. The mobile experience will improve on a number of devices, including mobile phones, PDAs and games devices, as the functionality of mobile devices is extended.
- Single log-in and authentication for all devices will be important to enable the seamless use of all devices; single authentication will also enhance the ability to personalise the user experience across these networked devices.
- All content will be delivered by networks and will be stored on separate hardware devices. The issue of 'distance' from your content (wherever it is stored) will no longer be relevant with cheaper, faster and seamless intelligent networking. The growth of new content storage devices such as Personal Video Recorders and DVD Recorders will alter the nature of both broadcast and packaged media markets.
- Falling voice revenues per mobile phone user together with market saturation will force mobile network operators to push new data/content to the user - including games, video clips and gambling - in an effort to increase ARPU and reduce customer churn.
- Mobile games will begin to rival static games in terms of uptake and revenue contribution.
- Mass entertainment will remain important as it enables 'communing' (i.e. groups of people talking about the previous night's episode of 'Eastenders'). This is difficult to achieve in the 'narrow cast' world and therefore mass entertainment channels and producers will continue to be key.

Market opportunities will be unlocked by a range of technologies

Key market opportunities within the OE&L sector include:

- Customer relationship management systems, which include support for a range of innovative business models, payment systems and secure transaction methods. Systems which enable the personalisation of services, supported by the analysis of user behaviour, will also help drive the market for OE&L.

- Digital rights management (DRM) which balances the need to protect copyrighted material with the requirement for user freedom to enjoy their OE&L content. For example, DRM that recognises the user as well as the device.
- Navigation tools, which enable the user to investigate multimedia content and personalise their searches. Navigation and search capabilities will also be enhanced by the development of self describing content and systems to automatically index content.
- Home networks which link hardware devices, including systems which require no set up. Ambient systems, which follow the user around the home, present a particular opportunity as does the development of systems on which self-adapting content (movies, games and music) can be played on a range of devices, as the content adapts to fit with the device on which it is played.
- Integrated mobile devices with enhanced display, processing, memory, battery and data storage functionalities. Higher specification devices will be important in unlocking demand for improved quality content, including 3D graphics and movies.
- Access to services anytime, anywhere will be enabled by multi-channel delivery of content adapting to delivery channels and devices, across operators and networks.

ITI Techmedia will use these key trends to identify appropriate Programmes

Using the acquired knowledge in this report as input, ITI Techmedia is undertaking further analysis of the functional needs to select those with the strongest Scottish 'fit' and the greatest potential to be a success when utilised within the identified markets. The selected functional needs will be used as input to define potential technology platforms as part of the ITI Techmedia programme selection process.

1 INTRODUCTION

1.1 Document Purpose

The purpose of this document is to provide a 'snapshot' view of the Online Entertainment and Leisure (OE&L) sector in order that the Membership:

- has visibility of the market analysis activities undertaken in this sector by ITI Techmedia
- can gain access to market information relevant to the sector
- is provided with an indication of the functional needs that ITI Techmedia will further explore to identify the technology platforms that will form the basis of ITI Techmedia research and development programmes.

This document should not be considered as providing a comprehensive analysis of the competitive environment within the OE&L sector. Such an analysis is beyond the scope of this document.

1.2 Structure and Content

This document provides market intelligence into the sector defined by the Intermediary Technology Institute (ITI) in Techmedia as Online Entertainment and Leisure (see Section 2.1 for the definition of Online Entertainment and Leisure). The information captured within the document has been obtained following the principles of market intelligence gathering, otherwise known as foresighting, established by the ITI. This process is described in an abridged form in Appendix 1.

During the process of developing this market intelligence report, both primary and secondary market data were acquired and collated. Primary data were collected during Market Intelligence Workshops attended by experienced individuals from industry and academia, supplemented by face-to-face interviews with key organisations in the sector. The primary data gathering process was augmented by desk research which was used to obtain secondary data from internationally recognised market analysts. Where possible, the source of any data used in this report has been identified.

Section 1: Introduction. This section covers the background, aims and scope of the Intermediary Technology Institutes (ITIs). It also provides a high-level description of the 'Techmedia' areas of focus. Further background information may be obtained on the website www.ititechmedia.com.

Section 2: Market Overview. This section provides a working definition of the Online Entertainment and Leisure sector, highlights the main characteristics of the sector, identifies the main trends, drivers and barriers, and describes generic value chains representing current business practice. This section provides a framework for the subsequent presentation and analysis of data in Sections 3 and 4.

Section 3: Market Assessment. This section provides an assessment of the market opportunities identified during the foresighting process. Each opportunity is defined and the main characteristics described in terms of drivers, inhibitors and the functional needs which will need to be met by any fulfilling technologies.

Section 4: Market Data. This section contains the relevant market size data for each market opportunity identified in Section 3. These type of data are traditionally derived from historical figures, and therefore market projections are best viewed as providing a base reference level from which informed extrapolations can be drawn. Where possible and appropriate, the segments identified in this report are matched to existing market data; where a new market opportunity is identified, a potential market size has been projected.

1.3 Background: Intermediary Technology Institutes (ITIs)

1.3.1 Economic Context

A global driver for economic growth is the development and exploitation of technology both for present needs and future requirements. Successful economies are underpinned by a vibrant research base that extends from basic science through to pre-competitive research and development with a clear focus driven by global market opportunities. Scotland has a reputation for world class research in many fields and already undertakes significant research activity in several areas that have the potential to be strong future market opportunities. In addition to the research base, most developed economies have institutes or organisations that promote knowledge generation and increase commercial exploitation capacity. The establishment of such organisations has had significant economic impact over the long term.

1.3.2 ITIs

The creation of the Scottish ITIs is aimed at increasing the effectiveness of Scottish businesses in the key global market sectors of Communications Technologies and Digital Media ('Techmedia'), Life Sciences and Energy, all targeted to address the particular (research) strengths and (company) weaknesses of the local economy. This is a long-term initiative and will be supported for a significant period of time (>10 years).

The ITIs are, in essence, a centre or "hub" for:

- identifying, commissioning and diffusing pre-competitive research that is driven by an analysis of emerging markets
- managing intellectual assets to maximise commercial and economic value
- interacting with each other to identify potential overlap or "white space" market opportunities between Techmedia, Life Sciences and Energy

An active Membership is core to the proposed Institutes; ITI strategy and operation will be actively guided and supported by its Members. It is essential to attract Members with a

broad global perspective on markets and new technology directions, as well as a local focus to ensure that propositions can be transferred effectively into the Scottish economy.

1.4 Definition of the Techmedia Sector

ITI Techmedia is centred on the development and creation of commercial opportunities encompassing the communications technologies and digital media sectors. The activities of the ITI will bring Scotland's economy to the cutting edge of emerging markets by allowing local companies to access and build upon pre-competitive technology platforms developed by the ITI.

The term 'Techmedia' arose out of the need to reflect the market evolution of what hitherto have been well defined, separate sectors of communications technologies and digital media. The overall trend in the marketplace is one governed by a value chain ranging from content/application generation, through delivery to consumption.

The following elements are examples of the areas which fall within the Techmedia remit. These are best viewed as illustrations and represent some of the over-arching philosophies:

- broadcast content: ultimately the product for which the customer is paying, either directly or indirectly
- service provision: the mechanisms for providing customer-driven content and applications
- delivery: technologies and infrastructure required to transport the digital content service to the end-user, as well as providing the feedback channels for interactivity.
- enabling software and systems integration: technologies and infrastructure required to condition, control and manage the delivery of content/service to the end customer.

One globally accepted trend is the delivery of content and services over multiple channels, e.g. the provision of same (or modified) content to be received over mobile devices, through TV sets or via PCs.

The concept of the multi-channel scenario provides one of the strands of a high level framework under which the core areas of opportunity can be surfaced, segmented and analysed. Content consumption is the key revenue generating stream in many of the markets, and is thus central to many of the drivers that affect future market evolution in the Techmedia sector.

The Techmedia sector is potentially very broad and hence a phased approach to market foresighting has been adopted. The first phase foresighting has concentrated on five major market areas, defined as:

- **Health**: the delivery of health services including clinical, education and administrative services through the processing, management or communication of information, including video, audio, graphics and signal data.

- **Retail Commerce and Finance**: the conducting of business transactions and the provision of financial services using electronic means, generally involving digital computers, electronic communications and the application of information technology. It includes the buying and selling of goods and services, the transfer of funds and related internal company functions.

- **Learning**: the provision, delivery and administration of learning through the use of new media and network technologies

- **Communications Services**: the provision, management and delivery of voice, video, data and IT services over wired and wireless communication networks. These include consumer and business services, vertical sector industrial applications and broadcast content.

- **Online Entertainment and Leisure**: the delivery of online digital entertainment and leisure to end consumers, specifically the market for online music, movie and gambling services over fixed and wireless networks

This Report is a first stage analysis of the market for Online Entertainment and Leisure.

1.5 Next Steps

This Report describes the results of the first stage of the ITI market foresighting process. As such, the Report describes the future market opportunities, challenges, key drivers and the potential technologies in the Online Entertainment and Leisure sector.

Using this acquired knowledge as the base input, the ITI will select those functional needs that have strongest potential market 'fit', and the greatest potential to be a success when utilised within the identified target markets. Scenario planning exercises will be used as one mechanism to achieve this. The result will be used to define potential technology platforms which will then be used as input to ITI Techmedia's programme selection process.

As ITI Techmedia progresses through this process, it will continue to report on results and progress to date to its Membership. Members will be offered the opportunity to provide comment and input to this process, and become actively involved in programmes.

2 MARKET OVERVIEW

2.1 Market Definition

Online entertainment and leisure covers a broad market sector, ranging from mobile through to fixed line broadband network-based services. For the purposes of this document, the definition of Online Entertainment and Leisure (OE&L) is:

> *"The market for online delivery of digital entertainment and leisure services to end consumers, specifically, the delivery of music, games, movie and gambling services over fixed and wireless networks and the personalisation of mobile phones (ringtones and infotainment content)"*

This Report also highlights, where relevant, applications and platforms which enable such services to be effectively delivered to the end consumer.

2.2 Market Segmentation

In this document, the following market segments are considered:

- Music
- Movies
- Games
- Gambling
- Mobile phone personalisation (ringtones)
- Infotainment content for mobile phones

In all cases, the market segments refer to digital content only, delivered online or across mobile networks. Activities relating to the role of online channels in the distribution of physical or non-digital goods and services are excluded, therefore, from these markets. In all cases, the focus is exclusively on the business to consumer (B2C) market. Therefore, digital cinema is excluded from the movies segment as this is classified as a business to business (B2B) activity: the digital content is distributed to a commercial entity, the cinema, rather than direct to the consumer. Digital cinema will form the subject of further investigation by ITI Techmedia, and a separate Market Intelligence Report will be published.

With the exception of mobile phone personalisation and infotainment content, which are by definition exclusively via mobile channels, all the market segments are defined to include fixed and mobile digital channels. Fixed channels include the internet; mobile channels include Short Message Service (SMS), 2.5G and 3G and other wireless internet channels.

The relationship between the market segments and delivery channels is illustrated in Figure 1 below.

Content type	*Fixed channel*	*Mobile channel*
Music	✓	✓
Movies	✓	✓
Games	✓	✓
Gambling	✓	✓
Mobile Ringtones		✓
Infotainment		✓

Figure 1: High-level market segments [Source: ITI Techmedia]

In Section 2.3 below, an overview of each of the high-level market segments is provided and major areas within each are identified and described. Supporting market revenue data for the different areas within each segment are provided in Section 4.

2.3 Market Description

The total market for filmed entertainment (film, video and DVD), recorded music and games across all formats has been valued at USD128 billion in 2003 and is forecast to grow by 9% per annum on average in the period from 2003 to 2008.[3] This is illustrated in Figure 2 below. The combined online revenue for movies, music and games is calculated at USD6.1 billion in 2003[4] which represents less than 5% of the total filmed entertainment, recorded music and games market. By 2008, however, online delivery is forecast to account for 13% of total movies, recorded music and games revenues.

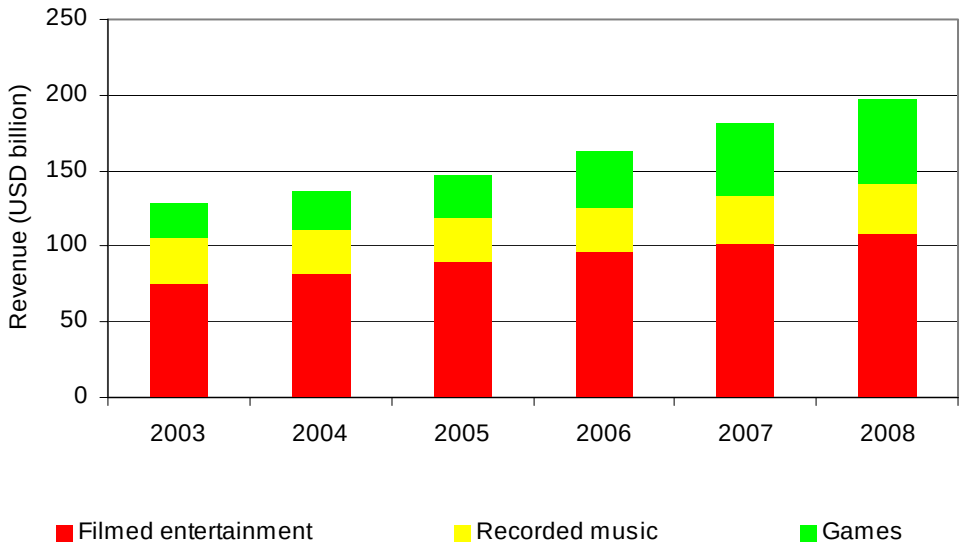


Figure 2 : Filmed entertainment, recorded music and games market size, 2003-2008 [Source: PwC]

[3] PwC
[4] RHK, Juniper

The OE&L market is currently the second smallest of the five market areas initially investigated by ITI Techmedia; the other four areas are Communications Services, Retail Commerce and Finance, Health and Learning. OE&L is currently just 42% of the size of the online Health market and less than 11% of the size of the online Retail Commerce and Finance market. Despite the rapid growth predicted for the OE&L market, it is forecast to be the smallest of the five markets in 2008, but will increase to 20% of the size of the Retail Commerce and Finance market.

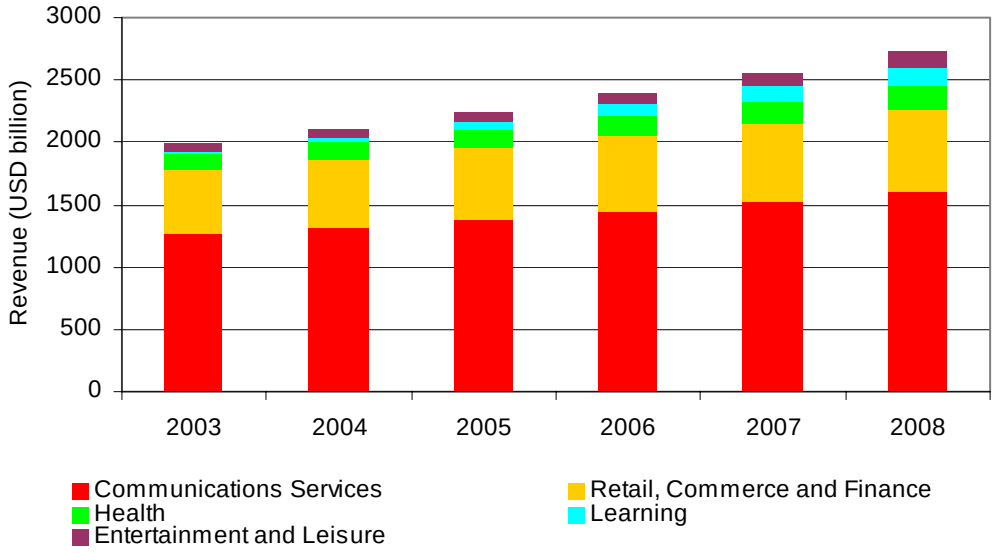


Figure 3: Online markets 2003-2008 [Source: ITI Techmedia]

The dominant OE&L market is the gambling segment. Gambling was valued at USD44.2 billion in 2003, accounting for 79% of the total OE&L sector. Games and mobile ringtones each accounted for 10% of the OE&L market in 2003. The combined revenues of the music and movies segments account for less than 1% of the market at USD219 million and USD68 million respectively.

Strong growth is forecast for the OE&L market. The market is expected to grow to USD130 billion by 2008, equivalent to a compound annual growth rate (CAGR) of 18% in the period from 2003 to 2008, as illustrated in Figure 4 below. The strongest growth is set to be experienced by the online music and movies segments, with a compound annual growth in the 2003-2008 period of over 100% forecast for both of these subsectors. Online games and online gambling are also forecast to grow rapidly, each with a CAGR of 18% over the period.[5]

[5] These figures exclude adult entertainment, an activity which generated USD3.6 billion in 2003, and which is forecast to grow to USD9 billion in 2008.

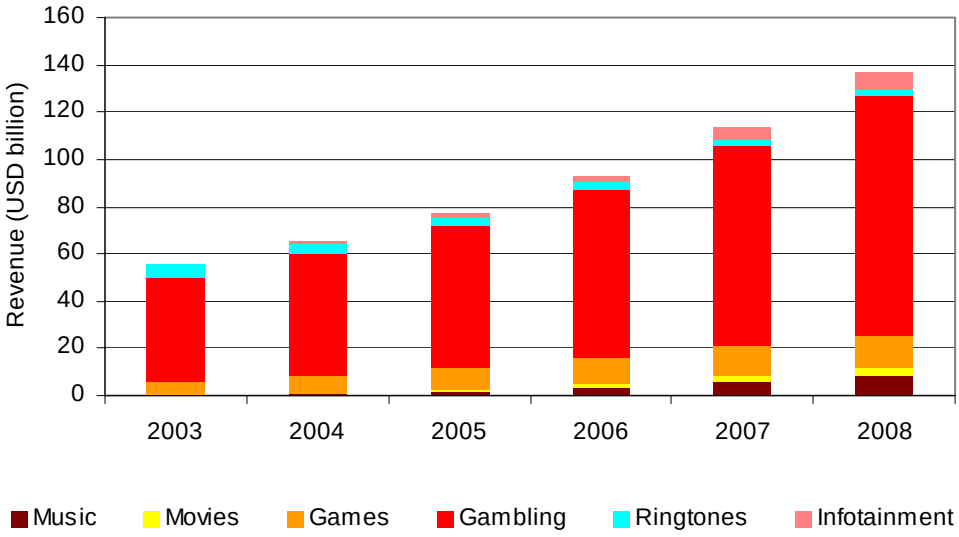


Figure 4: Entertainment & Leisure market size by segment, 2003-2008 [Source: ITI Techmedia, RHK, Juniper]

Overall, the relative importance of the six segments of the OE&L market is set to shift away from ringtones towards movies and music. The share of the OE&L market accruing to movies is forecast to reach 2.5% (USD3.2 billion) by 2008, and music's share is forecast to reach 6.5%. Gambling is forecast to maintain its share of 79%, driven by the continuing success of fixed online gambling and the rapid uptake of mobile gambling. The shifting market shares for each of the segments over the period 2003 to 2008 are shown in Figure 5 below.

	2003	*2004*	*2005*	*2006*	*2007*	*2008*
Music	0.4%	1.1%	2.5%	3.9%	5.8%	6.5%
Movies	0.1%	0.4%	0.7%	1.4%	2.2%	2.5%
Games	10.5%	11.4%	12.1%	12.0%	11.3%	10.3%
Gambling	79.1%	79.8%	79.5%	79.0%	78.2%	78.9%
Mobile Ringtones	9.9%	7.3%	5.2%	3.7%	2.5%	1.8%
Mobile Infotainment	0.3%	1.0%	1.9%	3.2%	4.4%	5.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 5: Market shares by segment 2003-2008 [Source: Juniper, RHK, ITI Techmedia]

For all market segments, several common factors will affect the rate at which the above segments will grow in the mid-term, including:

- The adoption of broadband by consumers
- The readiness of incumbents to develop online distribution services
- Resolving digital rights management (DRM) issues to balance the needs of the industry with those of the consumer
- Addressing the 'format' issue – especially in music services – to move from multiple incompatible formats towards greater compatibility, as witnessed in the offline market
- The need for incumbents, especially the telecom operators and ISPs, to deliver additional revenues through data services as revenues form voice decline

The importance of infrastructure improvements, such as higher broadband uptake, as a driver of the OE&L sector is hard to overstate. For example, broadband customers are far more likely than dial-up customers to use the internet to access entertainment and leisure content as Figure 6 illustrates. The number of households with a broadband internet connection is forecast to increase by a CAGR of 20% between 2003 and 2008, from 80 million to 200 million households, with 70% of all broadband households outside of the US by 2008.[6]

Activity	*Number of times more likely that broadband customers will perform the activity than dial-up customers*
Download videos/movies	5.7
Use peer-to-peer file sharing sites	4.25
Listen to audio streaming	3.3
Play online	2.9
Download music	2.7

Figure 6 : Internet usage by European broadband and dial-up customers [Source: Forrester]

Similarly, the growth of high speed wireless internet connections will facilitate the development of the mobile entertainment and leisure market. The number of high speed mobile internet capable subscribers is forecast to grow at a CAGR of 59% between 2002 and 2007, reaching 559 million. This represents an increase in the penetration of high speed wireless connections as a share of all mobile subscribers from 5% and 33%.[7]

A high level overview of the major segments in the OE&L sector, reflecting the way the industry is currently organised, is presented in the following Sections.

[6] IDC
[7] BWCS

2.3.1 Music Delivery Services

Market Structure

Music delivery services are currently delivered predominantly via fixed online, rather than mobile, connections. The main methods of delivering digital music are downloading and streaming. Downloading involves saving music files, typically to a personal hard disk, to play both online and offline. Streaming allows the user to play music files whilst online, but not to own the files. To date, downloads have proved more popular than streaming (subscription) with consumers and are forecast to account for 75% of music delivery services in 2004.[8] As Steve Jobs of Apple claims, "people want to own their music, not borrow it".

Online music delivery services have generated limited revenues to date, estimated at USD219 million globally in 2003.[9] This represents less than 1% of the total global recorded music market, valued at USD30.6 billion.[10] Mobile online music accounts for only 2% of the total figure for online music delivery services. It is worth noting that these figures relate only to music content and do not include the sale of music storage and playback devices.

The compact size of digital music files in formats such as MP3 and WMA (Windows Media Audio) makes them quick to download. Furthermore, the files can be copied easily to recordable compact disc and therefore played on existing equipment, or transferred to dedicated format players, enabling the music product to be enjoyed away from the PC. Files can be shared (copied) between users without sacrificing quality, creating the possibility for piracy.

The headline market size figures understate the financial and strategic importance of downloading to the music industry. The popularity of illegal downloading music files has been phenomenal. At its peak in 2001, Napster, an illegal music file sharing site, had an estimated 60 million users per month. Despite a crackdown by authorities on illegal file sharing sites and the development of legal alternatives, the volume of illegal downloads still outstrips that of legal downloads by a factor of over 100 to one.

The music industry has been accused of ignoring the commercial potential of online music, whilst illegal P2P file sharing sites developed strong positions. Record companies reacted to the threat posed by the illegal sites through court actions against the site owners and the consumers of illegal downloads, but did not make their content legally available in digital format. It is only since 2002 that major record labels have begun to view the internet as an important distribution channel for their product and have made their content digitally.

Unlike the CD, which has been the universal format for all digital music content for over two decades, there is a range of digital music formats. A number of content, software and hardware providers have developed proprietary digital music formats in an attempt to overcome the piracy issue and establish a standard that can be licensed to gain universal market coverage. Apple has been the most successful player to date at developing a position in the online music market, through a combination of its iTunes pay per track download service and iPod portable playback hardware.

[8] Forrester Research
[9] Juniper, RHK
[10] PwC

iTunes was launched in the US in April 2003 and took just 16 months to achieve 100 million downloads, priced at USD1 per track. Apple's share of the online music delivery market has been conservatively estimated at 70%. Other players include the re-launched, legitimate version of Napster; Sonic Selector, which is owned by Microsoft and has 350,000 tracks in the WMA format; and Sony Connect, which was launched in the US in Q2 2004 and has 300,000 tracks in its own proprietary format, Atrac 3. Music delivery services operate a range of subscription, payment per track and hybrid payment models. No one model dominates and although the simplicity and transparency of the payment per track model used by iTunes appears to be one of the reasons for the service's popularity, it is probable that a number of payment models will co-exist.

Apple sold an estimated 3 million iPods, with an average price tag of around $350, between its launch in November 2001 and March 2004, with half of these sales made since October 2003. Apple's market share of the portable music device market has been put at 30% by the Yankee Group, rising to 60% for the sub-market of portable hard disk storage music devices.

Music downloaded from iTunes can only be played on an iPod, due to the coding systems for the digital rights management (DRM) used by Apple. (The DRM technology also restricts the number of computers on which iTunes can be played and the number of times the same playlist can be copied onto a CD.) Apple has licensed its iPod hardware and software technology to Hewlett Packard, enabling Hewlett Packard to develop its own portable hard disk storage music devices. Rival Sony is following a similar business model to Apple, as its Sony Connect will only be compatible with Sony MiniDisc players. The commercial challenge is clear: to develop the industry standard which locks in consumers and device producers. The early market dominance enjoyed by Apple suggests that it is well positioned to develop this standard.

Interoperability and the need to establish a universal standard will be crucial factors in the development of the online music segment to 2008. Controlling piracy, whilst enabling the consumer to get value from their music will be a further challenge for the music industry and digital rights management technology will therefore be critical to the growth of the sector.

The continuing penetration of broadband connectivity, coupled with innovative pricing models, will be major drivers for online music delivery.

Market Evolution

The market for mobile music services is still very much in its infancy. As with the fixed line market, service providers are currently pursuing both the download as well as streaming models. The significant players in the mobile music delivery market include mobile operators, retailers and new platform providers. Mobile devices onto which music can be directly downloaded are beginning to be introduced and Nokia and O2 are amongst the players launching devices.

Wireless streaming services are also beginning to evolve. Sony and Real Networks have announced that wireless streaming services are to be launched in 2004. The DRM requirements and royalty payment issues for streaming services are not as stringent as for downloads and this may help accelerate the development of streaming services.

The online music delivery sector is forecast to grow by a CAGR of 108% between 2003 and 2008. Fixed online music delivery revenue is estimated to increase from USD214

million to USD7.9 billion during this period (CAGR 106%). Mobile online music delivery revenue is starting from a lower base, with minimal revenues in 2003, and is predicted to grow to USD0.56 billion in 2008.[11] These growth trends are shown in Figure 7 below. Due to the download time, it is questionable whether downloading direct to mobile devices will rival the current model of downloading through a fixed line connection and transferring content to portable (and therefore mobile) devices.

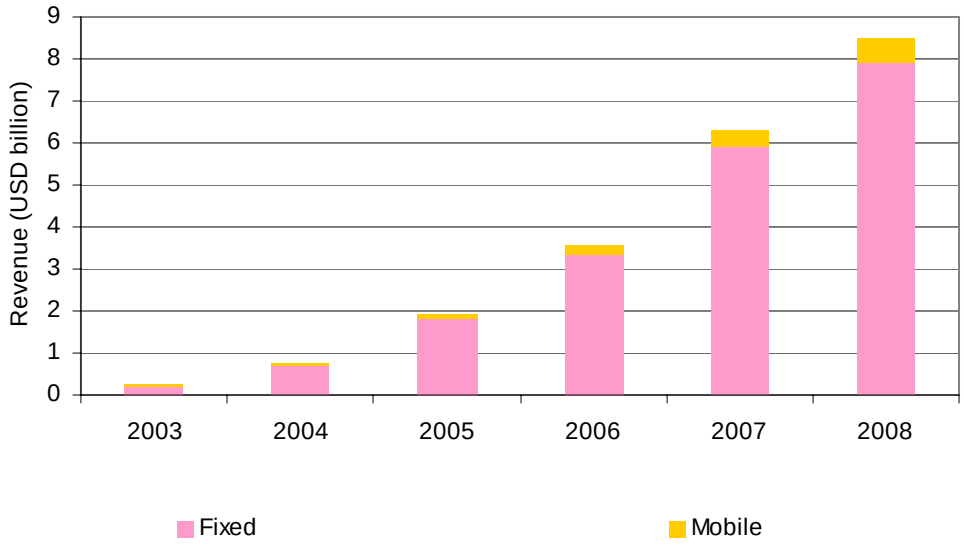


Figure 7: Online music delivery market size, 2003-2008 [Source: Juniper, RHK]

The overall growth trends in the recorded music market are shown in Figure 8 for each of the main formats. This illustrates, firstly, the forecast shift between formats, from CDs to online, with online accounting for 25% of the market in 2008. Secondly, growth of the overall market is forecast at a CAGR of just 2% over the 2003-2008 period. This is an improvement on the recent performance of the sector, which shrank by a CAGR of 5% between 1999 and 2003, and reinforces the importance to the music industry of developing online content delivery channels. This view is supported by EMI's market forecasts, which state that the share of sales from physical formats will drop from over 95% of sales in 2003 to 69% of sales in 2008.

[11] Juniper, RHK

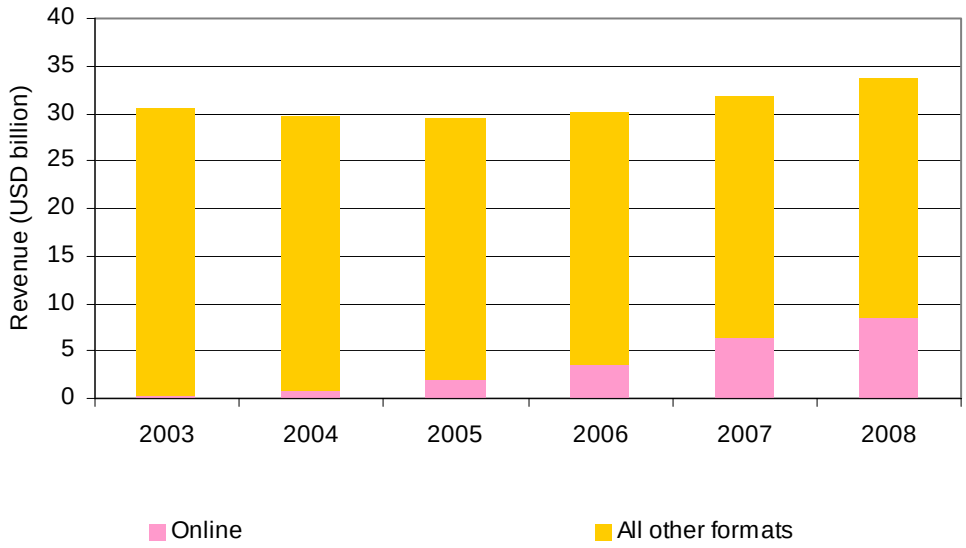


Figure 8: Global recorded music market, by format, 2003-2008 [Source: Juniper, RHK, PwC]

2.3.2 Mobile Personalisation (Ringtones)

Ringtones have been the killer mobile personalisation application, generating an estimated USD5.5 billion in global revenues in 2003.[12] Ringtone revenues were equal to 18% of the global market for recorded music (CDs, downloads, vinyl and other formats) in 2003.

The key players in this market to date tend to be platform and application providers rather than music companies. Most of the payment is charged via premium SMS or premium rate numbers rather than traditional payment mechanisms. The average price of a ringtone is around USD2.94 which compares with USD0.99 per downloaded music track.

Under the current business model, at least in Europe, a large proportion of the content revenue is retained by the network operator. Typically, the split of the revenue on music ringtones and other download services is 60/40 in favour of the content owner. However, this model is currently under review with content owners demanding a greater share of revenues. In the case of NTT DoCoMo in Japan, the content owners typically retain 90% of the content revenue (excluding the transport cost, all of which is retained by the network operator).

The uptake of ringtones has been high, particularly in Europe where an estimated 44% of all mobile phone users have downloaded a ringtone in 2003.[13] Globally, 26% of all mobile phone users have downloaded a ringtone. Juniper forecasts that the penetration of mobile ringtones among users of mobile phones will decline to 28% in Europe in 2008 and to 16% globally. The total number of ringtone customers is forecast to peak at 369 million in 2005, declining to 290 million in 2008. This represents a CAGR of -3% between

[12] Source: Juniper
[13] Source: Juniper

2003 and 2008. Juniper predicts a more pronounced decline in the price level of ringtones, with prices forecast to more than halve between 2003 and 2008 to USD1.49. Taken together, these trends will contribute to the reduction in the size of the ringtones market by an average of 16% per annum between 2003 and 2008, leading to a market size of USD2.3 billion.

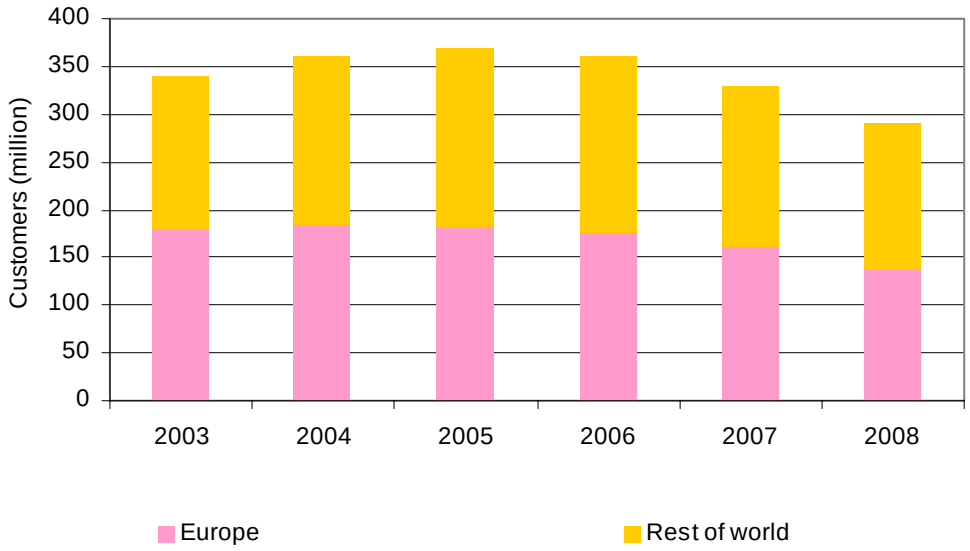


Figure 9: Number of ringtone customers, 2003-2008 [Source: Juniper]

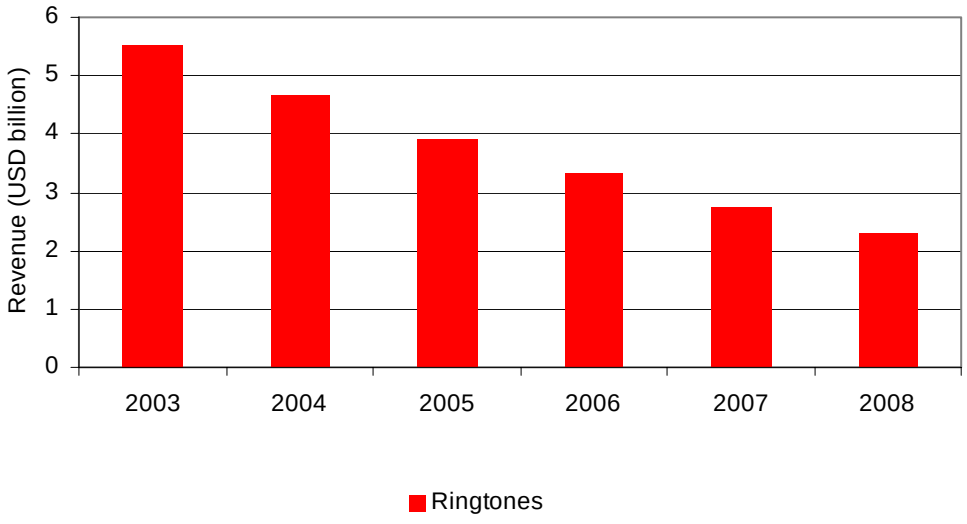


Figure 10: Ringtone market size, 2003-2008 [Source: Juniper]

These figures reflect the maturity of the ringtones market, particularly in Europe. There is a clear perception that ringtones are novelties whose appeal is beginning to wane, and a market which is increasingly price sensitive. Ringtones are also likely to face competition from other forms of mobile personalisation, such as graphics, logos and greetings. Juniper forecasts that these areas will grow by 5% CAGR between 2003 and 2008. Mobile music, discussed above in Section 2.3.1, is also a substitute for ringtones as the performance of mobile music devices improves.

2.3.3 Mobile Infotainment

Mobile infotainment refers to entertainment and leisure content delivered to mobile phones, other than music, movies, games and gambling content. The key content types covered by infotainment are current affairs, news and sports information; and specialist "magazine" content. The mobile infotainment market is valued at USD150 million in 2003 and is forecast to grow at a CAGR of 117% to USD7.2 billion in 2008.[14]

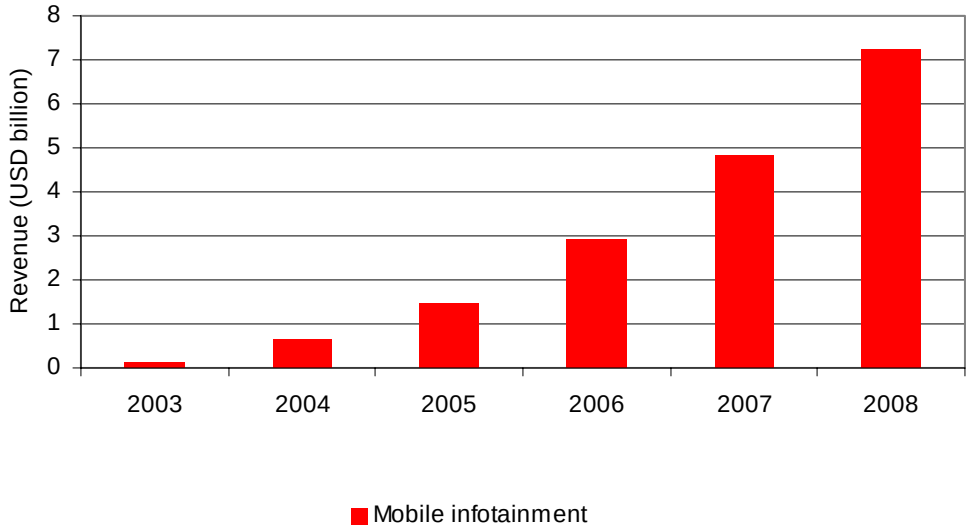


Figure 11: Mobile infotainment market size, 2003-2008 [Source: Juniper]

The main drivers of growth in the infotainment market are likely to be the uptake of wireless internet and handset improvements, enabling high quality, interactive content to be piped to the user. Infotainment content is currently delivered largely by SMS. MMS provides a richer content experience, including text and moving images.

Mobile newspapers or "news feeds" provide a likely service for early adopters of mobile infotainment content. The user can receive their chosen newspaper directly on their mobile device. The most appropriate delivery method would appear to be MMS as it can cater for both text and picture content. One current example of such a product is a Swiss service called '468'. There are two daily editions of the newspaper, containing world news, domestic stories, stock indices, sports news and gossip.

[14] Juniper

Mobile magazines are the counterpart to mobile newspapers but providing stories in a typical magazine format. The advantages of the mobile platform would be exploited to add a touch of immediacy, interactivity and personalisation to the content. Mobile magazines and newspapers could also provide a lucrative m-commerce opportunity by allowing users to complete their transactions with advertisers immediately via their mobile phone. It could also provide some interesting promotional opportunities whereby the promoter can target specific customers by location, time and propensity to purchase.

Therefore, it is logical to assume that a mobile equivalent is a potential opportunity at least in specific markets or target groups. The MMS platform also lends itself to providing serialisation in a timely manner. There are some services such as the Mobile Comics Network offering this service in the US on selected mobile networks. Payment comes as part of the platform either via premium SMS or included within the subscription to the service provider.

Content preference is likely to be for "just-in-time" content, such as breaking news and recent sports highlights – something that the consumer cannot wait to see on a full screen. Providing personalised information will also be important to ensure consumer interest.

2.3.4 Movie Services

The online delivery of movie services – often referred to as PC Video on Demand (PC VoD) – is a relatively immature market. The revenue generated in 2003 from PC VoD has been estimated at just USD68 million.[15] This compares with a total global market for filmed entertainment (film, video and DVD) of over USD75 billion in 2003.[16] Movie rentals generated over USD9.5 billion and non-PC VoD a further USD170 million in the US in 2003, emphasising the limited relative uptake of online movie services to date.

Close parallels exist between the music and movie delivery services. Both industries have established distribution channels and content ownership concentrated in the hands of a small number of powerful providers. The dominance of these major studios is particularly pronounced in the US market. A further similarity between the music and movie industries is the significant concern over the content piracy.

The size of files and the length of time taken to download movies have limited the level of illegal film file sharing. This has given movie content providers a relative level of respite from peer to peer, or casual, copyright infringement, compared to their music industry counterparts. Also, movie is less portable to optimal playback devices than music files. This has further insulated the major studios from the need to develop online business models.

However, illegal downloading of movie content does appear to be growing rapidly. A survey undertaken in June 2004 on behalf of the Motion Picture Association of America (MPAA) reported that 24% of all European internet users questioned claimed to have illegally downloaded a movie. The MPAA believes that between 400,000 and 600,000 movies are illegally downloaded globally each day.

[15] Source: RHK
[16] Source: PwC

To date, there has been limited involvement from major studios in the provision of content for online delivery. The main exception is MovieLink, a joint studio initiative bringing together the content from five of the seven major studios (Metro-Goldwyn-Mayer Studios, Paramount Pictures, Sony Pictures Entertainment, Universal Studios and Warner Bros. Studios.) Currently, the MovieLink service is only available in the US due to territorial licensing issues. No single service has yet to bring together content from all seven of the studios and the number of films that are available for legal download remains far lower than the number of DVD titles.

In Europe, the two key initiatives are Homechoice, a VoD services provided by Video Networks Ltd and Fastweb which offers a similar service in Italy, along with some remote PVR functionality. To date, Fastweb has had relatively more success in attracting subscribers.

Pricing models tend to be either one-off payments or subscription, with customers given the right to download a movie onto their PC hard drives where it will remain "active" for a stated period, typically 24 hours from the time it is first accessed. This "rental" approach is a well established method of distributing film content and one that does not entirely cannibalise the DVD sell through market. It is anticipated that a "rental" model will continue to prevail for online movie services.

The capability of hardware devices has also limited the development of PC VoD to date. Despite Microsoft's attempts to narrow the gap between PC and TV functionality with the Windows XP Media Centre, the TV remains the preferred device for the viewing of movie content in the home. The dominance of the TV has been reinforced by the strong uptake of flat/widescreen technology.

Hardware and network limitations have also greatly restricted the development of wireless movie content delivery. For example, mobile operator '3' provides music videos, sports and news clips rather than full length movies. Initial research on consumer preferences on the use of 3G applications suggests that the interest in downloading and viewing video clips on a mobile is low, and that using handsets for videophone purposes will be preferred.[17]

Movie content has a number of distribution channels, ranging from theatrical release, home video (including DVD) rental and retail, pay per view/VoD, pay TV, network TV and syndication. The use of these channels is staggered, with each channel having a "window" of use. A standard distribution windows schedule for a movie is shown in Figure 12 below. Online distribution in digital format represents a new distribution channel for movie content. This distribution channel will need to be integrated with the overall distribution windows schedule to minimise competition between distribution channels. PC VoD is likely to occupy the window between theatrical release and home video.

[17] Source: TNS

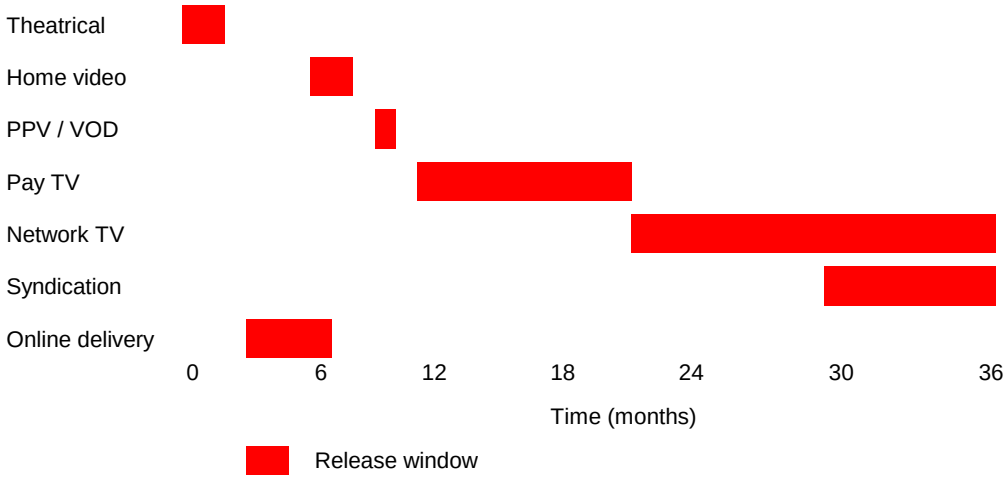


Figure 12: A standard distribution windows schedule for movie content with forecast scheduling of online delivery window [Source: ITI Techmedia]

One of the major factors that will encourage studios to make content available online is the ability to distribute direct to the consumer, thereby removing the need to share revenues with physical distribution partners such as video/DVD rental stores or retailers. A further driver will be to defend against piracy. Given the probable timing of the release of digital movie content - after theatrical release and prior to or in parallel with home video release - this strategy is likely to be most effective at countering P2P piracy.

The effective implementation of digital rights management (DRM) is likely to be a key factor in the development of the movie services market. DRM grants "conferred rights" to the users. Examples of conferred rights include the right to play content for a 24 hour period, or only to play on a given device. A number of events indicate the growing importance of DRM for online movies. Firstly, device makers - such as Hewlett Packard and the world's two largest hard drive manufacturers Seagate Technology and Maxtor – have begun to incorporate DRM in their products for the first time. Secondly, content providers are also beginning to show an interest in DRM technology research. For example, Time Warner purchased a stake in ContentGuard, a DRM provider, in April 2004. A further factor is the success of iTunes, which demonstrates that DRM can be applied in the marketplace.

The announcement of a DRM standard for moving images by the International Standards Organization (ISO) and the Moving Picture Expert Group (MPEG) heralds the first in a series of DRM industry standards to be established by the ISO. This is viewed by commentators as a significant step towards developing a format, product and security-technology neutral universal system for DRM, which enables interoperability of content across all devices.[18] The commonly held view is that interoperability is still some years away and that competing proprietary solutions will remain prominent. This will encourage "walled garden" environments, where consumers are required to download a particular software application to enable access to specific content from a specific source. According to RHK, this should be straightforward for PCs, but smaller capacity devices

[18] Source: RHK

such as PDAs and mobile phones are likely to be unable to handle the DRM systems required.

The market for online movie services is forecast to grow to USD3.2 billion by 2008.[19] This reflects a substantial growth of 116% CAGR between 2003 and 2008, far exceeding the equivalent growth figure of 7.5% CAGR over the period for the total filmed content market.[20] However, online movie services are forecast to remain only a small proportion of the total filmed content market, accounting for just 3% in 2008. To put this figure in context, physical rentals currently account for 13% of the total filmed entertainment market.

Sell-through DVD sales are predicted to show the strongest growth. This is likely to restrict the market for alternative windows such as online movie delivery. Online movie delivery is likely to be competing most directly with physical rental distribution channels.

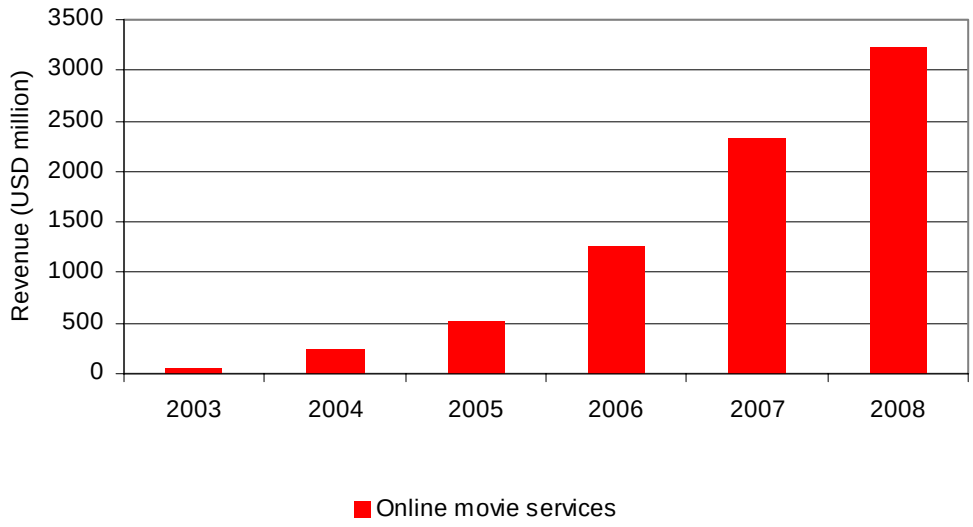


Figure 13: Movie delivery market size, 2003-2008 [Source: RHK]

2.3.5 Games Services

The online games market is forecast to grow from USD5.85 billion to almost USD14 billion between 2003 and 2008, an average growth rate of 18% per annum. The fixed and mobile games markets are forecast to grow at a CAGR of 28% and 15% respectively over this period.[21] The fixed online games market is forecast to reach USD3.7 billion in 2008 and the mobile segment USD9.7 billion. Figure 14 outlines the growth trajectory for the fixed and mobile market segments.

[19] Source: RHK
[20] Source: PwC
[21] Source: RHK, Juniper

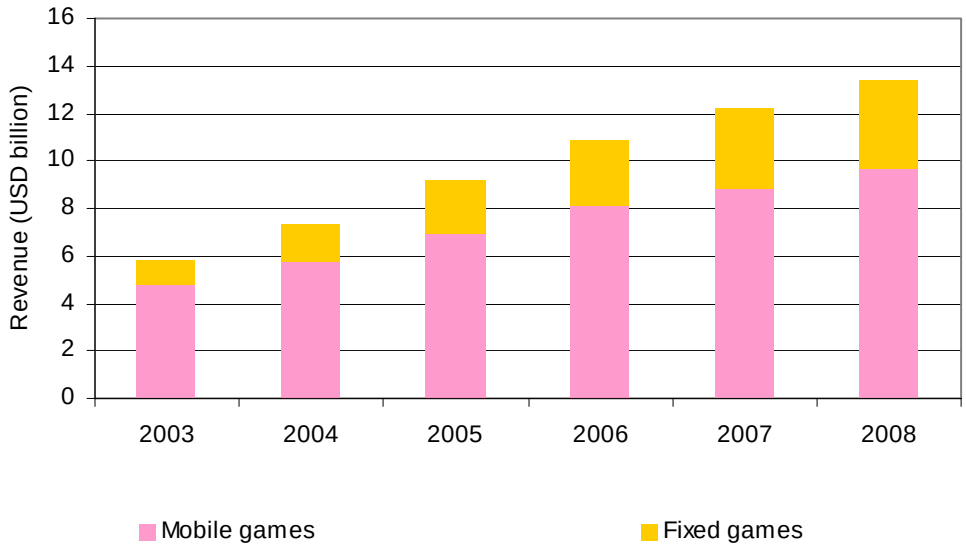


Figure 14: Online games market size, 2003-2008 [Source: Juniper, RHK]

Simple (text-based) mobile games are predicted to remain an important component of the overall mobile market to 2008. The split of mobile games revenues between simple and sophisticated games (defined as non text-based games) in 2003 is estimated at approximately one third to two thirds (32% simple, 68% sophisticated). Despite the ongoing improvements in handset and network quality, simple games are forecast to extend their share of the mobile games market to 36% in 2008.[22]

Online games software is forecast to account for a growing share of the total games software market between 2003 and 2008.[23] Online, defined by Informa to exclude mobile, is forecast to increase its share of the total games software market, from 3% in 2003 to 11% in 2008. The share of the total games software market accruing to mobile games (software and hardware) is forecast to grow from 4% to 21% over this period.

The market for online games can be segmented along the following two dimensions: method of delivery and the hardware device used to play the game. Figure 15 below illustrates this segmentation and shows the activity levels to date in each of the market segments.

[22] Source: Juniper
[23] Source: Informa

Hardware device		*Delivery method/activity level*	
		Network (GoD)	*Download*
Fixed	*Console*	no activity	low
	PC	low	moderate
Mobile	*Mobile handset*	moderate (SMS-based)	high

Figure 15: Online games market segments with indicators of activity levels, 2003 [Source: ITI Techmedia].

Consoles

Of the three major games consoles, Sony PlayStation 2, Microsoft Xbox and Nintendo Gamecube, only two are currently broadband enabled: PS2 and Xbox. However, they are very different in their approach to the online games service.

The initial objective of both companies is to enhance the games experience by adding an online component as well as driving retail sales of the titles. The longer term objective of both players is to use the device as a multimedia console which could deliver other forms of content into people's homes. In fact, there are already trials in various stages which use these consoles to deliver streaming video and audio content to the TV. It is estimated that, as of early 2004, there are around 100,000 Xbox and around 150,000 PlayStation online subscribers. The number of game titles which have an online functionality is gradually increasing.

Xbox comes 'network-ready' with a broadband-only connector, whereas PS2 requires an optional network adaptor costing around USD15. The Xbox service, which is branded Xbox Live, is a 'centralised' service provided by Microsoft for a fixed annual subscription fee. Sony has pursued a more decentralised model (called Central Station) in which only the authentication takes place on their platform and all other elements are managed by the games publishers. PlayStation does not charge for its online service.

Several issues make online games a tough proposition to implement, including:

- Customer relationship management
- Quality of service
- Security issues
- Content control issues

Currently, the main benefactors of online console games are likely to be the device manufacturers and games publishers. So far, ISPs and Network Operators have not managed to derive any additional revenues from this sector. However, there is a view that, as the market develops, there may be an opportunity to offer a 'premium connectivity' service based around quality of service and other factors.

The key drivers for this market include:

- Propensity for console gamers to play multi-player games with distant players
- Range of network-enabled games titles
- Greater uptake of broadband connectivity
- New genres of multi-player online
- Pay Per Play games online ('try before you buy')

PC

The streaming of games over broadband networks onto a PC platform has yet to take off. A number of reasons have been cited for the limited development to date of the area, including:

- A lack of titles
- Fear by publishers of upsetting their retail partners
- Problems in the quality of service over the network

Industry experts predict that network games for the PC platform could be a significant revenue generator for both the publishers and ISPs. Screen Digest estimates that the market for PC Games on Demand (GoD) services will be greater than the PC download market by 2007. The GoD market is split between Pay Per Play (PPP) games and "Massive Multiple Operator Games" (MMOG). PPP games have experienced the strongest growth over the past 12-18 months, driven by uptake by the casual gamer. Key drivers for the streaming online PC market include a guaranteed quality of service by the ISP/Network Operator; an increased range of available titles; and effective pricing models (such as subscription, pay per play, and try before you buy).

Mobile Games

Current uptake of mobile games is high, particularly amongst younger consumers. A UK survey undertaken in 2003 revealed that 63% of all 15 to 17 year olds had played a game on their mobile phone in the past week, with this figure dropping to 22% for 25 to 34 year olds. The Asian market, and in particular Japan, is the most developed geographical market to date.

The mobile games market faces a number of drivers and inhibitors to growth. A key growth driver is the requirement for mobile network operators to offset falling voice revenues with alternative revenue streams, which has led to strong support by the networks for games initiatives. Poor handset quality - particularly screen size and resolution and memory constraints – has previously limited the sophistication of mobile games. However, substantial handset improvements, including the widespread introduction of colour graphics and polyphonic ringtones have enabled higher specification mobile games. The greatest development to date in handset and games quality has been the introduction of Java-based games. The penetration of Java games technology has been rapid since its inception in 2003 and it is forecast that 80% of phones sold in the UK in 2004 will be Java enabled. Despite these advances, it is felt

that mobile games quality will not reach that of current console games for at least the next two or three years.

Network quality has restricted the development of mobile network games and the delivery of real time, multiplayer mobile games will require a 3G network. The price sensitivity of the target market for mobile games may also inhibit the growth of the market. The target market is the youth market, a market that is predominantly pay as you go and particularly sensitive to handset prices.

One example of the market's price sensitivity was the need for Nokia to re-launch its 7650 games phone at half price to reach the pre-paid mass market. A further major inhibitor to mobile games has been the cost of developing games for a wide variety of handsets and networks. The establishment of a set of standards will make development easier, but this has yet to occur.

Delivery Methods

Downloading is the main delivery method to date for online games. Games may be downloaded on either a one-off payment or a subscription model. Mobile downloads are currently the most important segment within mobile games. Games are available at low cost and adoption of mobile downloads has been high. For example, each of the mobile operators in the UK currently offers between 10 and 20 games, available to download at a cost of £1 to £5; in the US, Verizon achieved 8.5 million game downloads by April 2003. PC downloads are growing in importance, particularly in those markets with high broadband penetration. Korea is believed to have the most developed PC games download market globally, supported by broadband penetration of internet households of over 80%.

"Network games", also termed Games on Demand, refers to streaming games over a network. This definition can be extended to include the delivery of games by SMS, referred to as "simple" games, an example of which is "Who wants to be a Millionaire?". In revenue generating terms, simple mobile games are currently the most important form of GoD in revenue generating terms. Network games on fixed line hardware devices have thus far been restricted to PC games.

2.3.6 Gambling Services

The online gambling market consists of fixed online and mobile gambling services. Fixed line gambling revenues have been estimated at USD43.9 billion in 2003.[24] The mobile gambling market is far less substantial, estimated at USD315 million in 2003.[25] Revenues generated by online gambling globally were estimated at USD33.6 billion in 2001, or 3.3% of total global gambling revenues.[26] The online gambling share is forecast to increase to 6% by 2008, illustrating the stronger growth expectation for this segment compared with the overall gambling market during the 2003-2008 period: online is forecast to grow at an estimated CAGR of 18% against 5% CAGR for the overall market. (*Note: These figures are based on the value of stakes placed.)*

[24] Source: RHK, ITI Techmedia
[25] Source: Juniper
[26] Source: Betting Offices Licensing Association

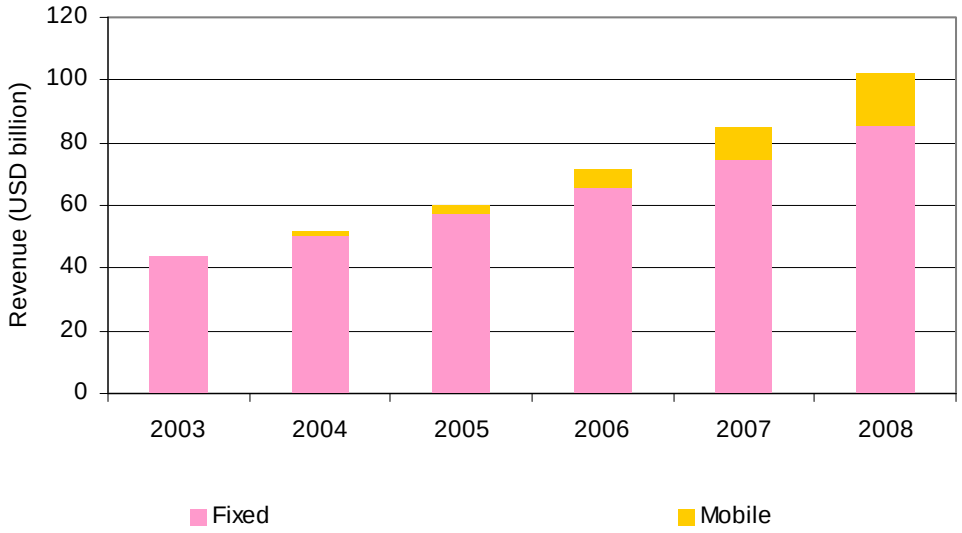


Figure 16: Online gambling market size, 2003-2008 [Source: ITI Techmedia, RHK, Juniper]

The fixed online gambling market is predicted to grow by a CAGR of 14% between 2003 and 2008, reaching USD85.6 billion by 2008. The mobile gambling market is forecast to grow at a CAGR of 121% over this period, from a low initial base of USD315 million to a value of USD16.6 billion in 2008.[27]

Online gambling via a fixed internet connection has been able to develop a strong niche position within the gambling market over the last couple of years. The conventional bookmaker model has been readily transferable to the internet, and the internet has also spawned a new gambling model: the gambling exchange. Both models operate as any other commodity market, with price setters and price takers interacting to establish a fair price (the odds) for a product (the bet). The distinction between the exchange and the bookmaker models lies in how prices are set: in the exchange model price setting is no longer performed by the bookmaker but by market participants. Under the exchange model prices are set and taken by the market, without intermediation from the bookmaker. This leads to greater efficiency in price setting and, generally, better odds for the gambler.

The advantages of gambling exchanges have proved compelling. In 2002 Betfair, the market leading gambling exchange, attracted bets to the value of over USD75 million per week, equivalent to over USD4 billion per annum.

Fixed odds betting such as lotteries and less dynamic variable odds gambling - delivered by the bookmaker model - are appropriate for fixed and mobile delivery channels. The standard capabilities of the current generation of mobile phones - SMS and voice - can facilitate these types of mobile gambling. MMS will allow the delivery of a richer experience – through, for example, the use of video clips – of these types of gambling.

To operate effectively, the exchange model requires a high volume of interconnected users and constant updating of prices and a fixed line internet site is a highly efficient

[27] Source: RHK, Juniper, ITI Techmedia

means of providing these conditions. The transferability of the exchange model to the mobile environment is likely to be restricted by the need for fast and reliable network connections for the transfer of data. 3G networks do however offer these capabilities and, in combination with sufficiently sized screens to track the changes in a number of bets, provide scope for the extension of the exchange model to the mobile platform.

There are a number of inherent features of gambling which make mobile delivery suitable, not least the fact that a mobile phone is uniquely personal. Mobile billing systems offer a convenient method of processing small payments and payouts, without the need for further authentication. However, payment issues will be more significant for higher value transactions, and this will be particularly acute for pre-pay customers for transactions which are greater than the total value of a pre-paid top-up card.

Regulatory issues are likely to be one of the most significant inhibitors to the growth of online gambling. Online gambling is officially prohibited in the US. However, the market has grown through the setting up of "offshore" gambling sites. ISPs have been unable to restrict access to these sites by US-based internet users as it has been impossible to prove the location of visitors to the gambling sites. Mobile gambling will be easier to police as it is possible to identify the location of the gambler.

2.4 Market Trends and Drivers

There are a number of trends and drivers which affect, or will affect, the OE&L market.

> *A **trend** is a discernible pattern of change, which can be linear, accelerating or decelerating. An example of a trend is: the average age of the UK population is increasing.*
>
> *A **driver** is a factor that directly influences or causes a change in a specific market. An example of a driver based on the above trend is: the need for easier to use interfaces in mobile phones making them accessible to the ageing population.*

The overall major trends and drivers impacting on the sector are discussed below.

2.4.1 Market Trends

The following market trends have been identified as the result of an expert foresighting exercise facilitated by ITI Techmedia and additional work undertaken by ITI Techmedia. The foresighting exercise was conducted in two parts: in-depth, one-on-one interviews with senior industry experts; and a structured workshop of industry experts. Appendix 4 provides the results of a survey of expert opinions on key trends.

The foresighting group was comprised of experts from the entertainment and leisure industry and included representatives of the following organisations: AOL, BT, Crown Castle, Disney, Deutsche Telekom, EMI, Sony, Video Networks, Vodafone and Warner Brothers.

The main market trends are listed below:

1. Increased personalisation of OE&L content to meet the needs of the consumers, founded on the availability of technology to monitor and understand the preference of consumers and provide personalised content; to enable consumers to search, select and customise their content; and to enable the customer experience to be personalised. Location-based information combined with context-related data will be highly important.
2. Increased availability and uptake of broadband connections. Broadband speed will continue to rise, driven by new services like VoD, Peer-to-Peer and video telephony. Predicted data rates are as follows:
   2000 – 512kbps
   2005 – 1Mbps
   2010 – 10Mbps
   2020 – 100Mbps

   NB These will vary from country to country.
3. Video over IP will be a key element of a new communications platform for the delivery of OE&L services.
4. Total 'integration' of communication services – sometimes known as Multi Media Services i.e. VOIP, Video, GSM, WiFi etc - will occur in the next 10 years.
5. Home networking will grow in importance as consumers increasingly expect to be connected and "always on" wherever they are in the home. Seamless connectivity between various devices (fixed and mobile) and between mobile (GSM), WiFi and Broadband will be crucial to enabling home networking and will drive the uptake of new applications and services.
6. Mobile and home devices will become more seamlessly integrated. The mobile experience will improve on a number of devices, including mobile phones, PDAs and games devices, as the functionality of mobile devices is extended.
7. Single log-in and authentication for all devices will be important to enable the seamless use of all devices; single authentication will also enhance the ability to personalise the user experience across these networked devices.
8. The PC will win out in the long term and become the dominant device in the home and be the centre of a variety of cheap CE devices which are connected to it. The mobile device will become the main device for in-journey services. Interactive Digital TV will be less important than the PC and the mobile device, and will remain an entertainment device rather than a services device.
9. Multiple "flexible screens", capable of handling all content types, will be integral to the home network.
10. All content will be delivered by networks and will be stored on separate hardware devices. The issue of 'distance' from your content (wherever it is stored) will no longer be relevant with cheaper, faster and seamless intelligent networking. The growth of new content storage devices such as Personal Video Recorders and DVD Recorders will alter the nature of both broadcast and packaged media markets.
11. Falling voice revenues per mobile phone user together with market saturation will force mobile network operators to push new data/content to the user - including

games, video clips and gambling - in an effort to increase ARPU and reduce customer churn.

12. Mobile games will begin to rival static games in terms of uptake and revenue contribution.
13. The rapid growth of illegal online music download sites has significantly altered the attitudes of both the music and movies industry to potential for digital delivery. There is a growing awareness of the opportunity that digital delivery presents.
14. Mass entertainment will remain important as it enables 'communing' (i.e. groups of people talking about the previous night's episode of 'Eastenders'). This is difficult to achieve in the 'narrow cast' world and therefore mass entertainment channels and producers will continue to be key.

2.4.2 Key Market Growth Drivers and Inhibitors

Due to the breadth and diversity of market segments within the OE&L sector, any attempt to identify growth drivers and inhibitors at the sector level will be limited to a summary overview. For example, it is often impractical to characterise a given factor as either a market driver or inhibitor at the sector level, as the impact of the factor will differ between the individual market segments. A fuller outline of the issues that influence growth must therefore be undertaken at the market segment level. This activity is addressed in Section 3. The sector level overview of the market growth drivers and inhibitors provided is therefore restricted to the following outline of the top line issues.

Market Influencer	*Comment*
Market maturity and threats to profit levels in existing markets	The PC, fixed line and mobile telecoms markets are all facing maturity and are seeking new revenue streams to offset areas in decline. This is driving the investment in new OE&L activities. For example, Microsoft and Intel are attempting to extend the functionalities and role of the PC as the centre of a home entertainment network with the launch of the Windows Media Center.
Copyright protection/Digital Rights Management	Content owners require confidence in their ability to protect content before making it available digitally. Digital rights management (DRM) will be particularly critical in the movies, music and games markets. The challenge will be to develop DRM which protects copyright whilst enabling the consumer freedom to enjoy their digital content. The iTunes DRM policy has been cited as one of the most successful to date in achieving this balance.
Content providers' approach to digital delivery	The availability of quality content will clearly be critical to the success of the OE&L sector. After showing early resistance, the main providers of movie and music content are engaging seriously with digital content delivery.
Consumer attitude to copyright piracy and preparedness to pay for online content	High levels of illegal downloading of music and movie content illustrates a general indifference to copyright ownership amongst consumers. This reinforces the need for appropriate DRM systems.
Network capabilities	The delivery of sophisticated mobile content has been limited by network capabilities to date. In particular, network games and gambling services will require at least 3G network connections. Broadband connectivity has been a major spur to the uptake of digital entertainment over the fixed line internet.
Hardware functionality and performance	Mobile devices must continue to improve display size, processing power and memory size to enable the enjoyment of sophisticated entertainment content.
Product and technological standardisation	The development of standards, particularly for content formats, is viewed as critical to the long term growth of the OE&L sector. In particular, consumers need to be confident that hardware will not become redundant or be restricted to only playing content from a limited number of sources. Partnership and co-ordination between members of the value chain is essential to deliver interoperability and standardisation.
Ability to personalise content to meet individual consumer needs	Mass customisation will be critical to ensure valued content can be delivered to the consumer. A real time awareness of consumer needs will be integral to the delivery of the right content at the right time. Location-based mobile online entertainment and leisure exemplify this approach to personalising content.

Figure 17 : OE& L market influencers [Source: ITI Techmedia]

2.5 Value Chain Analysis

Value chain analysis is a widely applied technique that is used to explore the specific activities through which entities can generate wealth within a particular industry sector. The techniques of value chain analysis can be applied to all sectors of the economy, although the nature of the value chain will differ between sectors. In this analysis, the value chain concept is used to illustrate the way in which:

- the introduction of new services creates opportunities as well as threats across value chain elements
- functional needs can have impact across different value chain elements.

A generic online entertainment services value chain is shown in Figure 18 below.

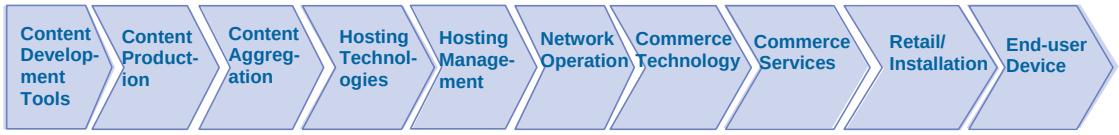


Figure 18: OE&L value chain [Source: ITI Techmedia]

The elements in the value chain are described in Figure 19 below.

Value Chain Element	Description
Content development tools	Tools for the development of OE&L content/applications
Content production	Production of OE&L content/applications
Content aggregation	Aggregation of content/applications from multiple sources
Hosting technologies	Technologies relating to hosting OE&L content
Hosting management	Hosting/management of content, to enable access to OE&L content; the application of hosting technologies
Network operation	Backbone networks including switches, radio network, SMS gateways and routers
Commerce technology	Technologies relating to payment/commercial access to OE&L content
Commerce services	Billing, customer management and the management of the user interface/experience with OE&L services; the application of commerce technology by, for example, an application service provider
Retail/installation	Sale, delivery and installation of end-user devices
End-user device	Stand-alone and networked device used in the delivery, playback and storage of OE&L content

Figure 19: Elements in the OE&L value chain [Source: ITI Techmedia]

The value chain described above is too complex for an initial analysis of functional needs as described in this report. A simplified value chain has been produced to enable the analysis of functional needs. The simplified value chain comprises four key segments:

- Content: elements relating to the provision of content/applications
- Hosting and networks: elements relating to the hosting and network distribution of content/applications
- Service provision: elements relating to the interaction with the end customer
- Devices: elements relating to devices utilised by end-users

The complex value chain maps onto the simplified version as follows:

Simplified value chain link	Complex value chain components
Content	Content development tools
	Content production
	Content aggregation
Hosting and networks	Hosting technologies
	Hosting management
	Network operation
Service provision	Commerce technology
	Commerce services
	Retail/installation
End-user device	End-user device

Figure 20: Mapping of simplified OE&L value chain onto the complex OE&L value chain [Source: ITI Techmedia]

The application of the simplified value chain to the analysis of functional needs is provided in Section 3.

Although the value chain is drawn in a linear manner with distinct parts, in reality there is a substantial overlap between the various elements. In the case of the OE&L sector, the value chain is in a fluid state, with incumbents and new entrants competing for market dominance.

In the OE&L sector, there is also a significant movement from both ends of the value chain towards the network operator element. In the pre-network era, the value rested with the device manufacturers and the content producers. In the new era, devices are being commoditised, mainly through subsidies from network operators as well as increased competition from new Far Eastern suppliers.

Content owners have so far been slow to tap the potential of emerging technologies in an effective manner. The rapid growth of illegal music downloading, partly due to the lack of legal alternatives and the low share of the value from the mobile ringtones accruing to the major music labels illustrate the initial slowness of content owners in addressing this market segment.

3 MARKET ASSESSMENT

This section summarises the identified market opportunities over the next 3 to 10 years. These summaries have been developed based upon:

- the views of experts who were asked to consider a ten-year horizon
- market research reports from 'conventional' analysts assessing a five-year horizon

Market opportunities are grouped under the OE&L market segments as described in Section 2.3. For each of the segments, the following three issues are addressed:

- Specific market growth drivers and inhibitors
- The technologies, or "functional needs", that are likely to assist in addressing market opportunities (a brief description of these technologies is provided in Appendix 3.)
- A "roadmap" indicating ITI Techmedia's view on the probable timeline for the introduction of the new technologies, mapped onto the revenue development path for the market segment

Market Opportunities

A number of the main market opportunities which are relevant across the OE&L sector have been identified as follows:

- Customer relationship management systems, which include support for a range of innovative business models, payment systems and secure transaction methods. Systems which enable the personalisation of services, supported by the analysis of user behaviour, will also help drive the market for OE&L.
- Digital rights management (DRM) which balances the need to protect copyrighted material with the requirement for user freedom to enjoy their OE&L content. For example, DRM that recognises the user as well as the device.
- Navigation tools, which enable the user to investigate multimedia content and personalise their searches. Navigation and search capabilities will also be enhanced by the development of self describing content and systems to automatically index content.
- Home networks which link hardware devices, including systems which require no set up. Ambient systems, which follow the user around the home, present a particular opportunity as does the development of systems on which self-adapting content (movies, games and music) can be played on a range of devices, as the content adapts to fit with the device on which it is played.
- Integrated mobile devices with enhanced user interaction, display, processing, memory, battery and data storage functionalities. Higher specification devices will be important in unlocking demand for improved quality content, including 3D graphics and movies.

- Access to services anytime, anywhere will be enabled by multi-channel delivery of content adapting to delivery channels and devices, across operators and networks according to the user's location and environment.

Where additional opportunities specific to a single segment have been identified, these are described within the relevant sections below.

Common Functional Needs

Functional needs relevant to these opportunities and to all of the market segments described in Section 2 are listed in Figure 21. Each functional need is mapped onto the elements within the simplified value chain to which it relates.

Functional needs	*Content*	*Hosting & networks*	*Service provision*	*End-user devices*
Advanced content processing and linking technology, metadata and self-describing content	✓	✓		
Advanced displays (e.g. OLED, haptic, flexible) for mobile entertainment				✓
Audio and videocompression (incl. HDTV)	✓			
Battery life/durability				✓
Billing (micropayment, authorisation)			✓	
Collaborative content creation tools	✓			
Content blocking and filtering solutions (e.g. for child protection)		✓		
Content protection (e.g. encryption, integrity, verification)	✓			
Convergence of end-user devices				✓
Digital asset management systems		✓		
Distributed databases/information (audio, video, games)		✓		
Downloading and streaming platforms		✓		✓
DRM, including copy protection, watermarks, traceability	✓		✓	
DVB/DAB in the handset				✓
Finegrained profile building		✓	✓	
Home ambient systems – follow user around the home				✓
Home management systems				✓
Home networks				✓
Improved audio sound quality (mobile)	✓			✓
Intelligent adaptation of dynamic business models	✓	✓	✓	✓
Intelligent wearable devices (e.g. wrist displays)				✓
Interactive reward mechanisms			✓	

Functional needs	*Content*	*Hosting & networks*	*Service provision*	*End-user devices*
Intuitive interfaces for navigation to access content		✓		
Shared content / services		✓		
Mobile transaction security			✓	
Multi-access networking services		✓		
Multi-channel interactivity / unified communications		✓		
Multi-channel, device independent, self-adapting content	✓	✓		
No set up devices for wireless home networks				✓
Ontology related distributed resources (related to OWL and semantic grid)		✓		
Peer-to-Peer applications		✓		
Personal content management (e.g. personal database access through mobile)		✓	✓	
Personal copyrights, not tied to devices		✓	✓	
Personal firewalls		✓		
Personal search navigation (incl. intelligent agents, metadata, datamining, user interface)		✓		
Photorealistic rendering	✓			
Recommendation engines based on preference/ behaviour		✓	✓	
Security of personal profiles		✓	✓	
Enhanced data storage on mobile devices				✓
Trust management of received content and supplier	✓			
Usage and behaviour analysis		✓	✓	
Voice control, personal profiles				✓
Watermarking and fingerprinting	✓			✓
Wearable and pervasive computers, devices and networks				✓

Figure 21: Identified functional needs relevant to all OE&L market segments [Source: ITI Techmedia]

A roadmap illustrating the likely timeline for addressing the main sector-wide functional needs is shown below as Figure 22.

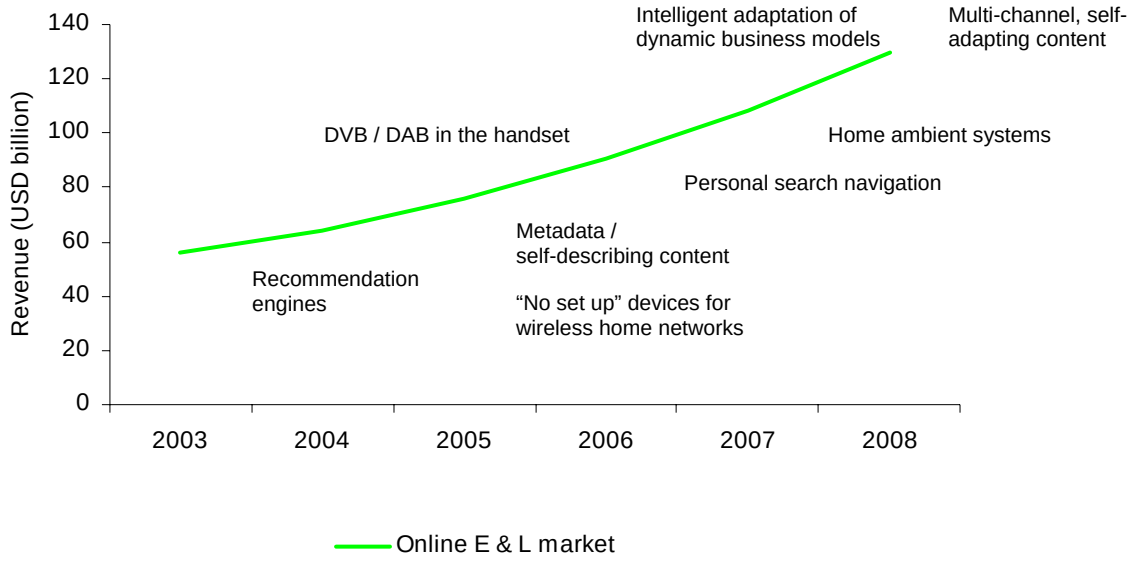


Figure 22: OE& L market roadmap, 2003-2008 [Source: ITI Techmedia]

3.1 Music Delivery Services

Drivers and Inhibitors

Major drivers and inhibitors that will affect the development of the music delivery services market are described in Figure 23 below.

Drivers	*Inhibitors*
An industry standard for content and playback	Failure to develop a universal content standard for DRM or file compression
Fair and simple DRM regulations	Piracy/failure to introduce appropriate secure DRM
Involvement of big brands with key appeal to the youth market	Consumer attitudes to copyright infringement
Ease of use, digital music delivery and storage	Lack of transparency/over-complexity of pricing and usage rules
Competitively priced storage and listening devices	Online payment systems and security
Handset capabilities, including long battery life	Failure to license artists' back catalogues for digital distribution
Broadband uptake	
Free legal sites/other innovative pricing models e.g. sponsored outputs	
Consumer acceptance of online delivery systems	
Wide range of content	

Figure 23 : Music delivery services, drivers and inhibitors [Source: ITI Techmedia]

Functional Needs

Functional needs which specifically relate to the development of music delivery services, together with their area of application within the simplified value chain, are illustrated in Figure 24 below. This excludes those functional needs common to all market segments within OE&L.

Functional needs	Content	Hosting & networks	Service provision	End-user devices
Convergence of music, video and into digital entertainment content	✓			✓
"Download to go" application		✓	✓	✓
Integration of digital broadcast and radio services with mobile services	✓	✓		

Figure 24: Identified functional needs, music delivery services [Source: ITI Techmedia]

3.2 Mobile Personalisation (Ringtones)

Drivers and Inhibitors

Major drivers and inhibitors that will affect the take-up of mobile ringtones are described in Figure 25 below.

Drivers	*Inhibitors*
Improved sound quality	Piracy / free downloading of ringtones
'Real music' downloads	Unrealistic pricing and business models
Sponsored ringtones	Narrow catalogue of ringtones
Wider choice of ringtones	Over complicated DRM
'Pre-loading' ringtones on handset – samplers	Consumer preference for complete tracks (i.e. music delivery services)
Easier access to ringtones	

Figure 25 : Mobile ringtones, drivers and inhibitors [Source: ITI Techmedia]

Functional Needs

Functional needs which specifically relate to the development of mobile ringtones, together with their area of application within the simplified value chain, are illustrated in Figure 26 below. (This excludes a number of the functional needs common to all market segments within OE&L and focuses on those of particular relevance to mobile ringtones.)

Functional needs	*Content*	*Hosting & networks*	*Service provision*	*End-user devices*
Audio and videocompression	✓			
Improved audio sound quality (mobile)	✓			✓
Watermarking and fingerprinting	✓			

Figure 26: Identified functional needs, mobile ringtones [Source: ITI Techmedia]

3.3 Mobile Infotainment

Market Opportunities

The main market opportunities of specific relevance to mobile infotainment include the following:

- Multi-channel content creation tools which allow content to be created for a range of devices or channels, including PC, PDA and mobile phones

- "Download to go" applications, which enable the user to instantly download mobile infotainment content directly onto mobile devices from locations such as airports and shopping centres

Drivers and Inhibitors

Major drivers and inhibitors that will affect the take-up of mobile infotainment are described in Figure 27 below.

Drivers	*Inhibitors*
Improved handset functionalities	Screen size and functionality limitations for portable devices
Introduction of 3G mobile networks	Consumer indifference to rich content delivered over the 2.5G network
Decline in average voice revenue per user and high costs of developing 3G, pushing introduction of new revenue streams by network operators	Availability of content/attitude of content providers to mobile content delivery
Development of appropriate business models, including integration of mobile and fixed line content delivery	Consumer reticence towards paying for content traditionally available for free online
Effective and fair DRM	Inability to provide content where delivery to a mobile device adds unique value (e.g. location specific services; just-in-time delivery)
Provision of personalised and timely content	

Figure 27 : Mobile infotainment, drivers and inhibitors [Source: ITI Techmedia]

Functional Needs

Functional needs that support the development of the mobile infotainment market, together with their area of application within the simplified value chain, are illustrated in Figure 28 below.

Functional needs	Content	Hosting & networks	Service provision	End-user devices
Adaptive content	✓			
Advanced displays (e.g. OLED, haptic, flexible) for mobile entertainment				✓
Audio and videocompression (including HDTV)	✓			
Context-aware entertainment content & services (location, weather)	✓	✓	✓	
"Download to go" application				✓
Enhanced data storage on mobile devices				✓
Head mounted displays (integrated glasses)				✓
Integrated digital audio, video and image processing (software & processor)				✓
Integration of digital broadcast and radio services with mobile services	✓	✓		
Motion sensitive devices				✓
Multi channel content creation tools (PC, PDA, TV, mobile phones, game consoles)	✓			
Self-labelling of content			✓	

Figure 28: Identified functional needs, mobile infotainment [Source: ITI Techmedia]

Figure 29 below illustrates the timing of the key functional needs, to 2008 and beyond.

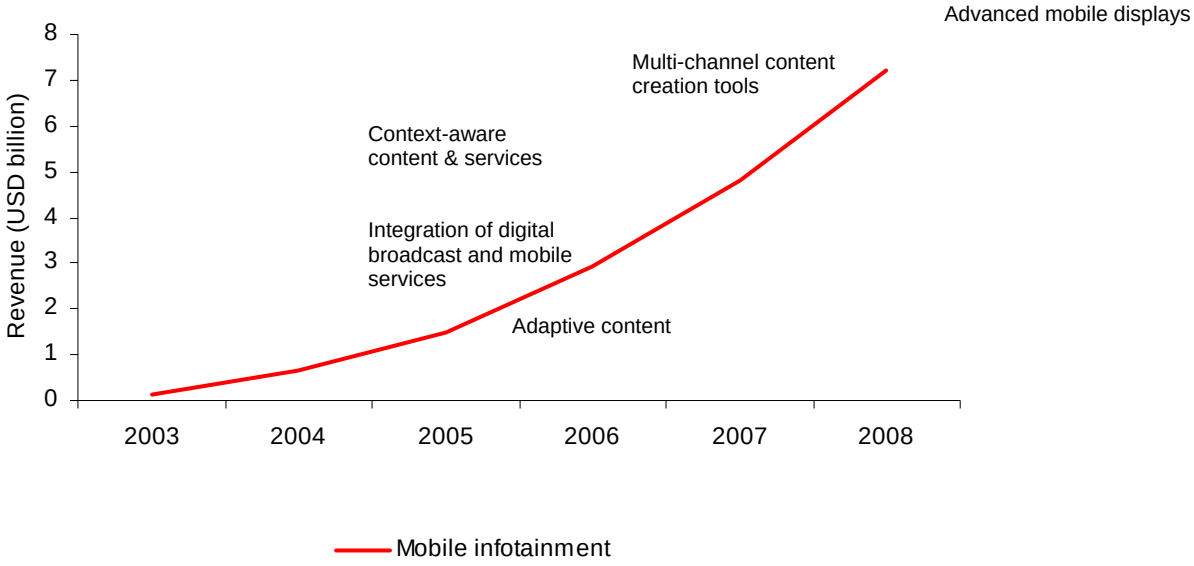


Figure 29: Mobile infotainment roadmap, 2003-2008 [Source: ITI Techmedia]

3.4 Online Movie Services

Market Opportunities

The main market opportunities of specific relevance to online movie services include the following:

- Multi-channel content creation tools which allow content to be created for a range of devices or channels, including PC, PDA and mobile phones
- Advancements in processing capabilities, particularly the development of integrated digital audio, video and image processing and DSP / video processors
- Advanced display multi-channel audio for the home cinema experience
- Video compression and streaming technologies, together with encryption and DRM to deliver video securely with QOS seamlessly across networks

Drivers and inhibitors

Major drivers and inhibitors that will affect the take-up of online movie services are described in Figure 30 below.

Drivers	*Inhibitors*
Integration of online delivery with the release schedule windows	Competition with other release schedule windows
Hardware / network functionalities, enabling downloaded movies to be viewed “in the living room” at near DVD picture quality	Consumer lock-in to existing hardware
Convenient and competitively priced storage and playback devices	Multiple standards / formats for content and hardware
Broadband uptake	Consumer attitudes to copyright infringement
Market maturity in PC markets, leading to the extension of PC functionality into a “media centre”	Online payment systems and security
Major studios’ acceptance of digital delivery, leading to a wide range of content	Failure to develop a universal content standard for DRM or file compression
Consumer acceptance of online delivery systems	Lack of transparency / over-complexity of pricing and usage rules
Fair and simple DRM regulations	

Figure 30: Online movie services, drivers and inhibitors [Source: ITI Techmedia]

Functional needs

The specific functional needs that support the development of movie services, together with their area of application within the simplified value chain, are illustrated in Figure 31 below. A number of the common functional needs outlined previously are relevant to the movie services segment. In particular, the development of appropriate DRM systems will be critical to the growth of online movie services.

Functional needs	Content	Hosting & networks	Service provision	End-user devices
3D turbographics (software & processor)	✓			
Adaptive content	✓			
Advanced displays (e.g. OLED, haptic, flexible) for mobile entertainment				✓
Audio and videocompression (incl. HDTV)	✓			
Convergence of music, video and into digital entertainment content	✓			✓
Downloading and streaming platforms		✓		✓
DRM, including copyright protection, watermarks and traceability	✓		✓	
Enhanced data storage on mobile devices				✓
Head mounted displays (integrated devices)				✓
Integrated digital audio, video & image processing (software & processor)				✓
Integration of digital broadcast and radio services with mobile services	✓	✓		
Multi-channel audio for online services				✓
Multi-channel content creation tools (PC, PDA, TV, mobile phones, game consoles)	✓			
Multimodal handset / user controls and interfaces				✓

Figure 31: Identified functional needs, online movie services [Source: ITI Techmedia]

Figure 32 below illustrates the timing of key functional needs identified above, to 2008 and beyond.

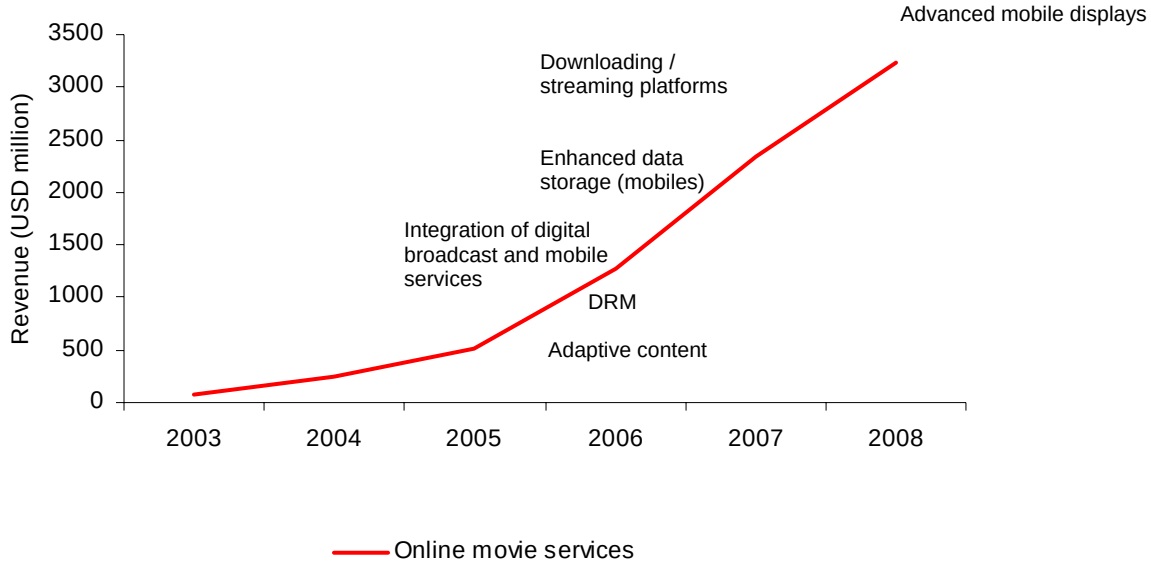


Figure 32: Online movie services roadmap, 2003-2008 [Source: ITI Techmedia]

3.5 Games Services

Market Opportunities

The main market opportunities of specific relevance to games services include the following:

- Games development tools and engines including authoring tools, physics engines and 3D turbographics (processors and software)
- Multi-channel content creation tools, which allow content to be created for a range of devices or channels, including games consoles, PC and mobile phones; and context- and location-aware content which adapts according to the user's environment.

Drivers and inhibitors

Major drivers and inhibitors that will affect the take-up of online games services are described in Figure 33 below.

Drivers	*Inhibitors*
Convenient and competitively priced games device	Screen size and functionality limitations for portable devices
Broadband uptake	Consumer indifference to rich content delivered over the 2.5G network
Greater quality and reliability of service over the network (mobile and fixed line internet)	Multiple games platform formats
Wider range of titles which utilise network and multiplayer functionality	Narrow range of
Innovative pricing models	Unrealistic pricing and business models
Simple and fair rules on accessing	Need to customise for each mobile phone handset / network combination

Figure 33 : Games services, drivers and inhibitors [Source: ITI Techmedia]

Functional needs

Functional needs that support the development of games services, together with their area of application within the simplified value chain, are illustrated in Figure 34 below.

A number of the common functional needs outlined previously are relevant to games services, in particular advanced mobile devices with enhanced displays; and the integration of games devices with other networked devices as part of networked home systems.

Functional needs	Content	Hosting & networks	Service provision	End-user devices
3D turbographics (software & processor)				✓
Adaptive content	✓			
Advanced displays (e.g. OLED, haptic, flexible) for mobile entertainment				✓
Context-aware entertainment content & services (location, weather) (incl. messaging)	✓	✓	✓	
Convergence of music, video and into digital entertainment content	✓			✓
Multimodal handset / user controls and interfaces				✓
Head mounted displays (integrated glasses)				✓
Integrated digital audio, video & image processing (software & processor)				✓
Mobile 3D graphics	✓			
Motion sensitive devices				✓
Multi channel content creation tools (PC, PDA, TV, mobile phones, game consoles)	✓			
Photorealistic rendering	✓			
Physical simulation environment – passive immersive seat, headset				✓
Physics engines e.g. for terrain mapping, virtual reality	✓			

Figure 34: Identified functional needs, games services [Source: ITI Techmedia]

Figure 35 below illustrates the timing of key functional needs identified above, to 2008 and beyond.

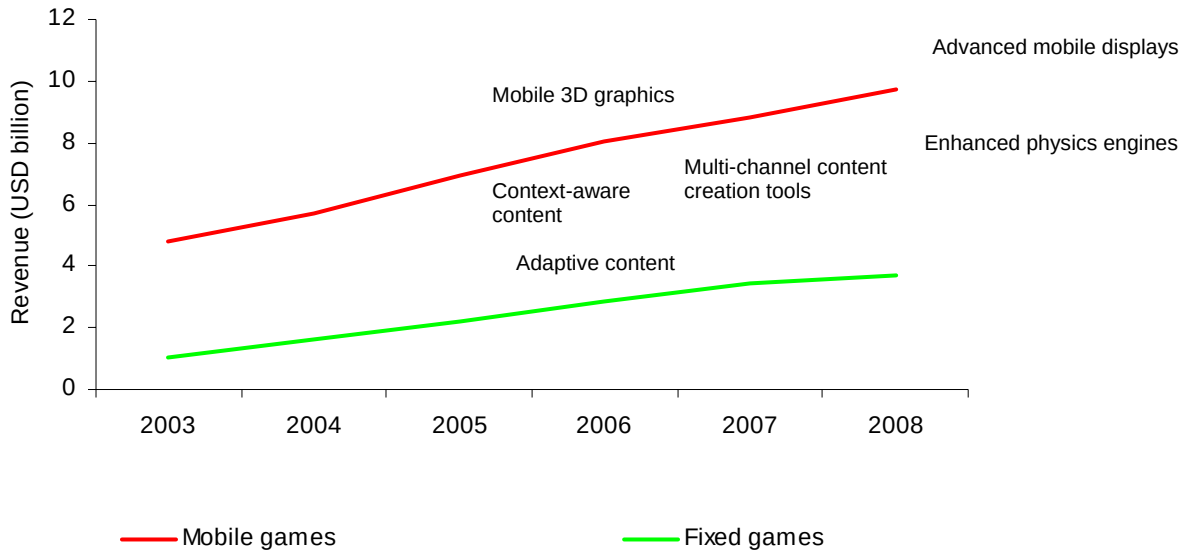


Figure 35: Games services roadmap, 2004-2008 [Source: ITI Techmedia]

3.6 Gambling Services

Market Opportunities

The main market opportunities of specific relevance to gambling services include the following:

- Fraud detection and prevention, and detection and prevention of collusion between betting exchange users
- Real time regulatory reporting
- Security of personal data, transactions, payments, trust of services and providers

Drivers and inhibitors

Major drivers and inhibitors that will affect the take-up of gambling services are described in Figure 36 below.

Drivers	*Inhibitors*
Broadband uptake	Online payment systems and security
Greater quality and reliability of service over the mobile network	Mobile payment systems, including transaction value limitations under “pay as you go” systems
Decline in average revenue per user and high costs of developing 3G, pushing introduction of new revenue streams by network operators	Corporate stance on gambling as a morally unacceptable activity
Licensing / regulatory controls on gambling relaxed	Continued tight regulation of gambling activities, particularly in the US
Success of “exchange model” online gambling sites	Mobile delivery of the “exchange model” restricted by network limitations
Mobile delivery enables consumer privacy to be maintained	

Figure 36 : Gambling services, drivers and inhibitors [Source: ITI Techmedia]

Functional needs

The specific functional needs that support the development of gambling services, together with their area of application within the simplified value chain, are illustrated in Figure 37 below. A number of the common functional needs outlined previously are relevant to the games services segment, such as the development of secure transaction methods and appropriate payment mechanisms, particularly for mobile gambling.

Functional needs	Content	Hosting & networks	Service provision	End-user devices
Adaptive content	✓			
Collusion detection and prevention			✓	
Context-aware entertainment content & services (location, weather) (incl. messaging)	✓	✓	✓	
Real-time fraud detection			✓	
Real-time regulatory reporting		✓		

Figure 37: Identified functional needs, gambling services [Source: ITI Techmedia]

4 MARKET DATA

ITI Techmedia has sourced market data forecasts for each of the market segments outlined in Section 2.3. These forecasts are provided in the following chapter.

4.1 Online Music Delivery Services

The online music delivery services market is forecast to grow from USD219 million to USD8.47 billion between 2003 and 2008, at a compound annual growth rate (CAGR) of 108%. The music delivery market will remain focused on the fixed line segment, which is predicted to maintain a market share of over 90% of the online market. Downloads direct to mobile devices are forecast to remain a niche area, with consumers downloading using a fixed line, despite the popularity of portable playback and storage devices.

Revenue (USD Million)	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*CAGR %*
Fixed line	214	710	1796	3340	5894	7914	106%
Mobile	5	30	102	218	406	555	160%
Total	219	740	1898	3557	6300	8470	108%

Figure 38: Online music delivery market size, 2003-2008 [Source: Juniper, RHK]

4.2 Mobile Personalisation (Ringtones) and Infotainment

The ringtones segment is the only OE&L segment which is forecast to decline in size over the 2003 to 2008 period. Infotainment revenues are predicted to grow rapidly to over USD7 billion by 2008. The combined infotainment and ringtones revenues will grow by 11% CAGR between 2003 and 2008 to USD9.5 billion.

Revenue (USD Million)	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*CAGR %*
Ringtones	5536	4671	3909	3310	2755	2281	-16%
Infotainment	150	636	1466	2926	4799	7230	117%
Total	5686	5307	5375	6236	7554	9510	11%

Figure 39: Ringtones and mobile infotainment market size, 2003-2008 [Source: Juniper, RHK]

4.3 Online Movie Services

Movie services delivered by online distribution are forecast to increase rapidly from a small base of USD68 million in 2003 to USD3.23 billion in 2008. This is equal to a CAGR of 116%. Movie services are predicted to double each year between 2004 and 2007.

Revenues (USD million)	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*CAGR %*
Movie services	68	240	510	1270	2340	3230	116%

Figure 40: Online movie services market size, 2003-2008 [Source: RHK]

The total market for movie services (filmed entertainment) across all distribution types is forecast to grow by 7% over the 2003 to 2008 period. The share of the market accounted for by online distribution is forecast to reach 3% by 2008.

Revenues (USD billion)	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*CAGR %*
Total filmed entertainment	75.3	82.1	89.4	95.9	102.1	108.0	7%
Online distribution as % of total	0.1%	0.3%	0.6%	1.3%	2.3%	3.0%	---

Figure 41: Filmed entertainment market size, 2003-2008 [Source: RHK, PwC]

4.4 Online Games Services

Fixed and mobile games segments are forecast to grow at 28% and 15% CAGR respectively, with the online games market overall forecast to grow by a CAGR of 18% over the 2003-2008 period. The online market is predicted to remain focused on the mobile sector, although the fixed games segment will grow from 18% to 28% of the total online games segment over the 2003-2008 period.

Revenues (USD billion)	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*CAGR %*
Mobile	4.8	5.7	6.9	8.0	8.8	9.7	15%
Fixed	1.1	1.6	2.2	2.8	3.4	3.7	28%
Total	5.9	7.3	9.2	10.9	12.2	13.4	18%

Figure 42: Online games services market size, 2003-2008 [Source: Juniper, RHK]

4.5 Online Gambling Services

Fixed and mobile online gambling segments are forecast to grow at 14% and 121% CAGR respectively, with the online gambling market overall forecast to grow by 18% CAGR over the 2003-2008 period. The market is predicted to remain focused on the fixed line segment, although the online gambling segment will grow from less than 1% to 16% of the total online gambling segment over the 2003-2008 period.

Revenues (USD billion)	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*CAGR %*
Fixed line gambling	43.9	50.2	57.3	65.6	74.9	85.6	14%
Mobile gambling	0.3	1.25	2.8	5.8	9.9	16.6	121%
Total online gambling	44.2	51.4	60.1	71.3	84.8	102.2	18%

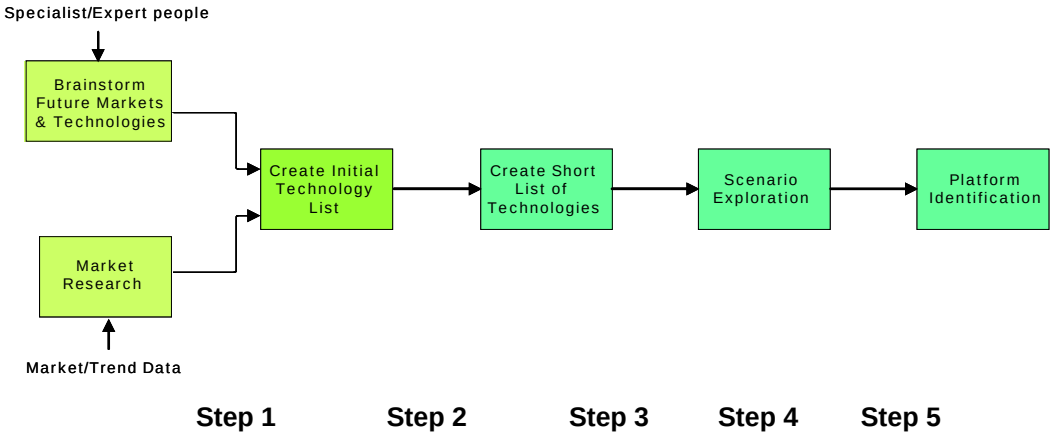
Figure 43: Online gambling market size, 2003-2008 [Source: ITI Techmedia, RHK, Juniper]

APPENDIX 1: THE MARKET FORESIGHTING PROCESS

The foresight process for market identification, which is at the heart of the ITI activity, has been established to meet three main objectives:

- to identify and define the potential for new and emerging global markets, over a three to ten year horizon.
- to provide an objective basis for assessment and comparison of any defined markets.
- to Identify and define key technologies and platforms that will enable the defined markets.

A market foresight process has been created and adopted by ITI Techmedia. It uses the experience and expert advice of organisations recognised as having best practice capabilities in this field. It is designed not only to meet the objectives detailed under 'Market Identification' above, but also to take into account other relevant factors including sector specifics, timescales and resource needs. The main elements of the process are shown in simplified format below.



Step 1 identifies a vision for the market opportunity, the challenges, key drivers and market and technology barriers. This is achieved using specialist market knowledge, input from expert individuals in organisations across the sector, product and service companies, research organisations through to regulatory and other government offices. This is then enhanced by existing market knowledge to estimate the possible market size, timing, geographies, and demographics to create views of the value chain, the main stakeholders and resultant business models.

Step 2 creates a long technology list relevant to the individual sectors which are reduced in Step 3 to a shortlist, using input from technology experts. The process so far identifies the technologies that best fit the market characteristics and hence highlight the most likely technology winners.

The technologies and markets are then validated in Step 4 via a process of scenario exploration (or planning) - a common tool used in foresighting environments. This uses

example events to test if the markets and technologies meet overall objectives and targets.

The final Step 5 identifies a resultant technology platform. A technology platform is defined as a cluster of connected technological capabilities comprising discrete technologies which together define a system with multiple potential applications.

The market foresight process and the usefulness of functions within it are subject to ongoing evaluation and refinement throughout, based on experience gained in the first phase.

APPENDIX 2: GLOSSARY

2.5G	General Packet Radio Service (GSM data service)
3G	Third generation GSM
ADSL	Asymmetric Digital Subscriber Line
ARPU	Average Revenue Per User
ASP	Application Service Provision
CAGR	Compound annual growth rate
CD	Compact Disc
DRM	Digital Rights Management
GoD	on Demand
GPRS	General Packet Radio Service (2.5G)
GSM	Global System for Mobile
HDD	Hard Disk Drive
HDTV	High Definition TV
IDTV	Interactive Digital Television
IP	Internet Protocol
ISP	Internet Service Provider
ITI	Intermediary Technology Institute
MMOG	Massively Multiplayer Online Game
MMS	Multimedia Messaging System
MP3	Format for digital audio files
OWL	Ontology Web Language
P2P	Peer-to-Peer
PC	Personal Computer
PDA	Personal Digital Assistant
PPV	Pay Per View
PS2	Sony Playstation 2 (console)
QoS	Quality of Service
SMS	Short Message Service
STB	Set Top Box
TV	Television
USD	US Dollars
UWB	Ultra Wide Band
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
WLAN	Wireless Local Area Network

APPENDIX 3: FUNCTIONAL NEEDS DESCRIPTION

3D turbographics (software + processor)	Next generation processors dedicated to sophisticated graphics capabilities
Adaptive content	Content which adapts according to location, time, profile and behavioural changes of the usage/user
Advanced content processing and linking technology, metadata and self-describing content	Automatic classification of data entries under descriptive headings, enabling content to be processed and linked to other datasets
Advanced displays (e.g. OLED, haptic, flexible) for mobile entertainment	OLED: organic light emitting displays; Haptic: responding to touch
Audio and videocompression (incl. HDTV)	Codecs are used to compress and decompress audio and video files. Common codecs include those for converting analog video signals into compressed video files (such as MPEG)
Battery life/durability	Battery storage capabilities for end-user devices that provide improved usage time before battery charging and improved device durability
Billing (micropayment, authorisation)	Payment systems for small and incremental amounts. Authorisation: the process of determining, by evaluating applicable access control information, whether a subject is allowed to have the specified types of access to a particular resource
Collaborative content creation tools	Content creation tools that enable multiple content developers to collaborate on development
Collusion detection and prevention	Ability to identify and prevent two or more parties from acting in unison to achieve a financial return by distorting the outcome of a game of chance
Content blocking and filtering solutions (e.g. for child protection)	Content blocking: the ability to block network traffic based on IP addresses. Content filtering: prevention of access to content based on the nature of that content
Content protection (e.g. encryption, integrity, verification)	Application of digital rights management techniques to protect content copyright
Context-aware entertainment content & services (location, weather) including messaging	Content and services using real-life external sources as elements within the entertainment and leisure experience (e.g., geographical location, weather); particularly relevant to mobile games
Convergence of end-user devices	End-user devices which combine the functionality of previously distinct devices e.g. the combination of phone and PDA technologies
Convergence of music, video and games into Digital Entertainment Content	Convergence of content formats into a single digital format which, from the user's point of view, does not distinguish between content types (music, video, games) as all content types can be played on the end-user device

Digital Asset Management Systems	A system which creates a repository for digital files and allows the content to be archived, searched and retrieved; also known as media asset management or digital asset warehousing.
Distributed databases/information (audio, video, games)	Systems to enable content providers to track and manage their content across a number of consumer download sites
“Download to go” application	Download access points located in public areas (e.g. shopping centres), enabling content to be downloaded direct to mobile devices
Downloading and streaming platforms	Platforms for downloading or streaming content. Streaming platforms provide the ability to deliver a continuous flow of content to an end-user device in a multi-vendor environment.
DRM, including copy protection, watermarks, traceability	Provide secure distribution of content and disable illegal copying and distribution of content distributed via communication networks
DVB/DAB in the handset	Digital video broadcast/Digital audio broadcast reception capability in the handset
Enhanced physics engines e.g. for terrain mapping, virtual reality	Part of a game engine that provides a simulation/approximation of physics (a model of forces like gravity, friction, inertia and how they effect in-game models)
Enhanced data storage on mobile devices	Improved data storage capacity for mobile devices
Finegrained Profile building	Consumer profiling built up by tracking and understanding behaviours
Head-mounted displays (integrated glasses)	The integration of glasses within personal computer devices
Home ambient systems – follow user around the home	Home networks configured to follow the user e.g. switching content between rooms
Home management systems	Management system to manage devices connected over a home network
Home networks	Digital network for the domestic environment, carrying video, audio and data, consisting of multiple networked devices
Improved audio sound quality (mobile)	Improved sound recording and playback quality for mobile devices
Integrated digital audio, video & image processing (software + processor)	Next generation processors dedicated to integrated digital audio, video and image processing
Integration of digital broadcast and radio services with mobile services	Delivery of digital broadcasts and radio, for example, using DVB (digital video broadcast) and DAB (digital radio) over IP (Internet Protocol) technology
Intelligent adaptation of dynamic business models	Modification of pricing and access rights per user, based on an understanding of preferences and behaviour using expert systems and AI

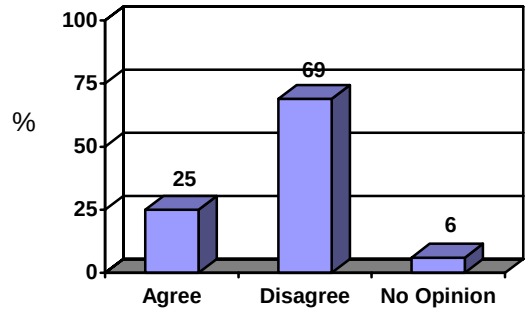
Intelligent Wearable Devices e.g. wrist displays)	Wearable computer devices
Interactive reward mechanisms	Technologies to enhance the interface/experience during user interactions with content providers by providing rewards for the user
Intuitive interfaces for navigation to access content	Intuitive search and display of search results for content
Mobile 3d graphics	Next generation processors dedicated to sophisticated graphics capabilities for mobile handsets
Mobile transaction security	Infrastructure for secure payment methods for mobile entertainment and leisure products and services
Motion sensitive devices	Devices controlled through the user's movements
Multi-access networking services	Seamless integration of personal networks, local area networks and wide area cellular networks
Multi-channel audio for online services	Multi-channel, cinema quality audio for online-delivered content
Multi-channel content creation tools (PC, PDA, TV, mobile phones, game consoles)	Creation tools enabling content to be created for multi- channels, i.e. media neutral
Multi-channel interactivity/unified communications	Access to content enabled through all communication devices
Multi-channel, device independent, self-adapting content	Content which recognises on which type of device it is being viewed and automatically adapts to the required end-user device format
Multimodal handset/user controls and interfaces	Handsets/user controls which respond to multiple user inputs, for example touch (haptics) and voice control
“No set up” devices for wireless home networks	Home networks which require no set up and which are automatically configured to enable "plug and play"
Ontology related distributed resources (related to OWL and semantic grid)	The development of an infrastructure where resources are adequately described in a form that they can be machine-processed as well as by people
Peer-to-Peer applications	Applications delivered over a network in which each end-user device is a network node, and each user device has the ability to communicate directly with every other network node
Personal content management (e.g. personal database access through mobile)	Content management systems to enable the end-user to access, catalogue and distribute their content across devices
Personal copyrights, not tied to devices	Technology recognising and authorising the individual - rather than the device - to duplicate copyrighted material

Personal firewalls	A software application used to protect a single Internet-connected device from intruders.
Personal search navigation (intelligent agents, metadata, datamining, user interface)	Intelligent agents: Retrieval tools which routinely scan networks and systems for information meeting specified criteria and present the retrieved information to the user; Data mining: Data processing using sophisticated data search capabilities and statistical algorithms to discover patterns and correlations in databases
Photorealistic rendering	Creation of photorealistic computer images using a graphics engine
Physical simulation environment – passive immersive seat, headset etc.	Environments for the end-user which physically simulate reality to enhance the entertainment experience
Real-time fraud detection	Ability to identify unusual patterns of betting in real time that may indicate that the outcome of an event or game of chance may have been illegally distorted
Real-time regulatory reporting	The ability to generate in real time the information necessary to demonstrate that betting and games services adhere to the prevailing regulatory environment
Recommendation engines based on preference/behaviour	Search capabilities which analyse consumer behaviour and preferences to enable the consumer to identify appropriate products
Security of personal profiles	Authorisation of access to personal information by evaluating control information; includes authentication of identity and security against unauthorised access
Self-labelling of entertainment content (e.g. for child protection)	The content provider categorises content by assigning a label; access settings are set by various user and server based filtering and blocking solutions
Shared content services	Tools for finding, integrating and delivering shared including security, auditing, billing/payment and service management
Trust management of received content and supplier	Authentication of the source of content, including watermarking
Usage and behaviour analysis	Analysis of consumer behaviour to provide creative and business intelligence for service adaptation/evolution and to provide targeted added value services
Voice control, personal profiles	Voice controlled user interface; voice recognition and personal profile awareness enable the user to maximise the efficiency with which instructions are given to the device

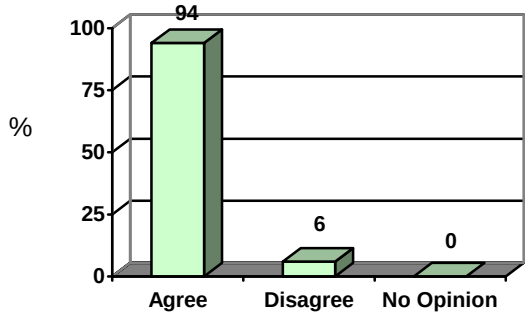
Watermarking and fingerprinting	Fingerprinting: derives identities of content items from the content itself, not from a special mark inserted into it, as watermarking does. Watermarking: a pattern of bits inserted into a digital image, audio or video file that identifies the file's copy and is invisible to the user
Wearable and pervasive computers, devices and networks	The network interconnection of devices, ranging from clothing to home appliances. Appliances have embedded technology (embedded with computing capability)

APPENDIX 4: SURVEY OF EXPERT OPINIONS

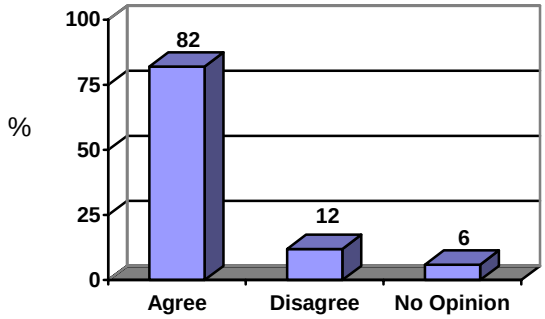
1. True Interactive Television could be the BIG thing several years from now



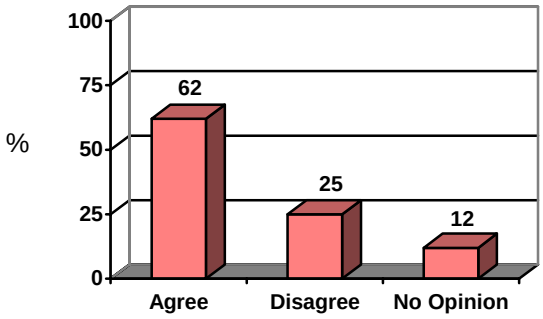
2. Future VOD will allow 'niche players' to deliver their own content directly to their segmented viewers



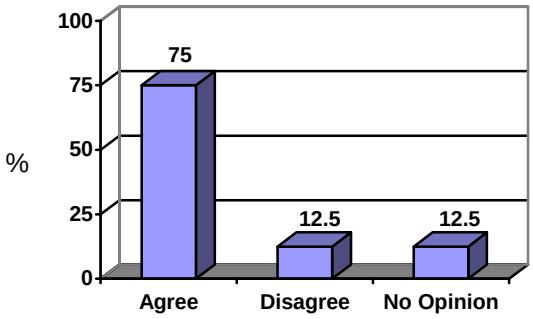
3. "Consumer videoconferencing could be part of the furniture in the future – being as common as voice telephony today"



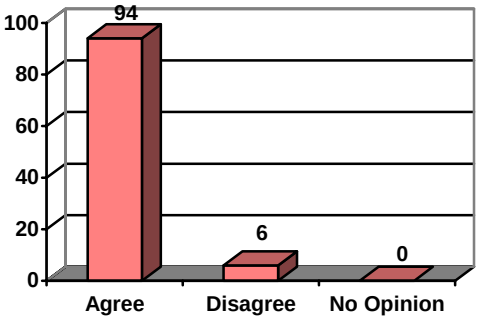
4. “A ‘hybrid’ of broadcast and DSL technology will be a killer combination for delivering True Interactive TV”



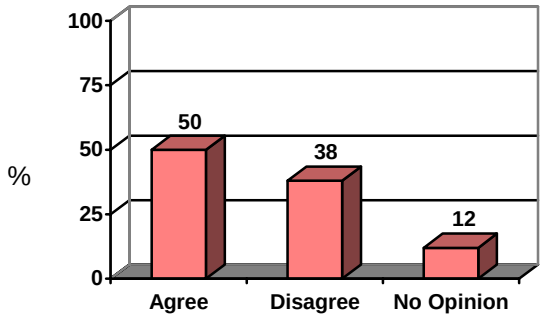
5. “In the future, devices will automatically choose the appropriate method of access for the user”



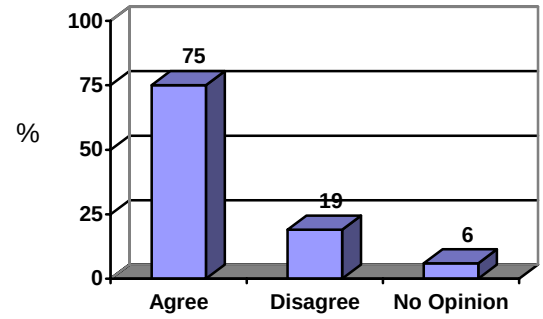
6. “Personalisation combined with advanced ‘needs analysis’ and ‘context’ software will be key in the future”



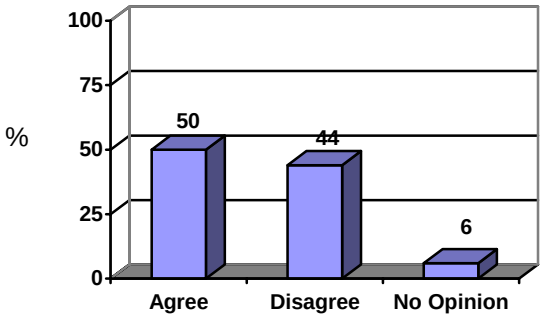
7. “The reality culture will expand, with everyday people starring in some popular games, videos and music”



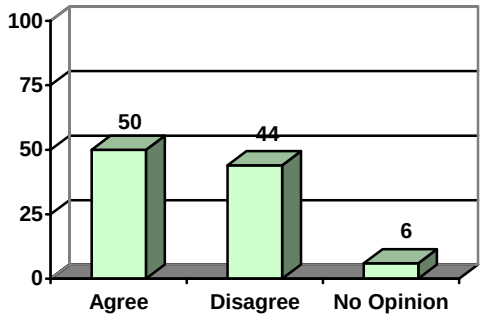
8. “Very small devices which can handle music, video and games and can work anywhere seamlessly will drive new services”



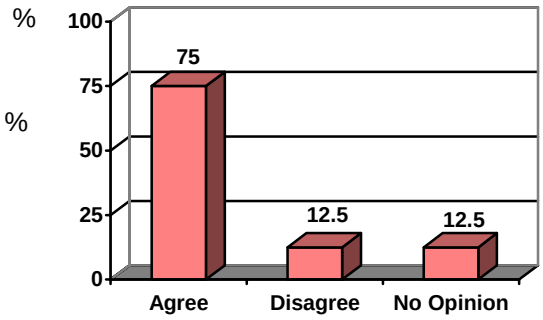
9. “It is going to be the **seamless** integration of mobile (GSM), WiFi and Broadband in the home environment which will drive new applications and services”



10. “PC will be the dominant device in the home and be the centre of a variety of cheap CE devices which are connected to it”



11. “Home networking will be BIG – the organisation that can seamlessly provide a simple connectivity solution at home between various devices will win in a big way”



12. “10 years from now, with Intelligent Networking it will be impossible for consumers to tell when they are ‘online’ or ‘offline’