The barbarians at the gate – Wireless LAN storms 3G citadel
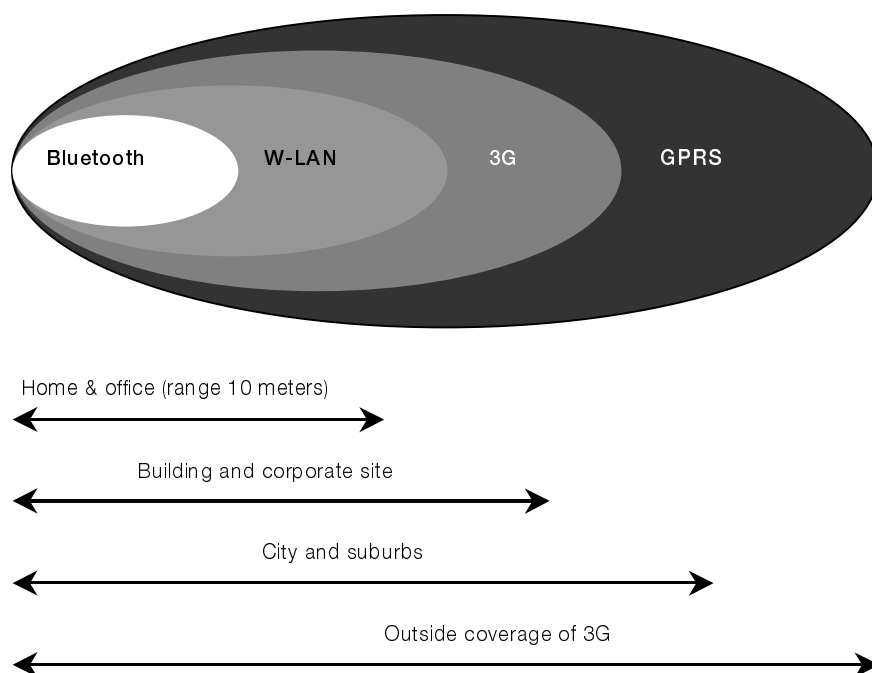
Introduction

Telecom Geneva in 1999 was the mobile phone industry's Woodstock, the place where hype and optimism were the tunes of the day. Mobile phone executives got high on dreams of a new era of data services. The fuse was lit and the share prices of some equipment makers, such as Nokia and Ericsson, took off like moon rockets.

If talk at Geneva had been about finding the 'killer service' which could kick-start the mobile internet, the recent GSM conference in Cannes February 2001 provided the answer. The 'killer service' was the 3G auctions. Think about that for a few seconds and then decide to laugh or cry. Dark humour aside, Cannes asked the industry a disturbing question. **Does the world really need 3G services?** In our view developments in the internet space, particularly in the 2.4GHz and 5GHz unregulated spectrum used by Wireless LAN and Bluetooth, pose a grave threat to 3G revenue forecasts. Rather ominously, if you have just bought a 3G license, this new technology is being called 4G and they will be built using Wireless LAN and GPRS technology.

A mobile industry burdened with high license costs is about to face a storm heading in from the internet. Operators fear that they will lose customers. Equipment makers fret that mobile handsets might be supplanted by Personal Digital Assistants (PDA). The market for expensive network equipment might shrink as operators share infrastructure or use cheaper internet based wireless technology, such as the new 802.11b 4G standard to build urban wireless networks.

15 March 2001

Sector

Technology Strategy

How different wireless technologies can fit together
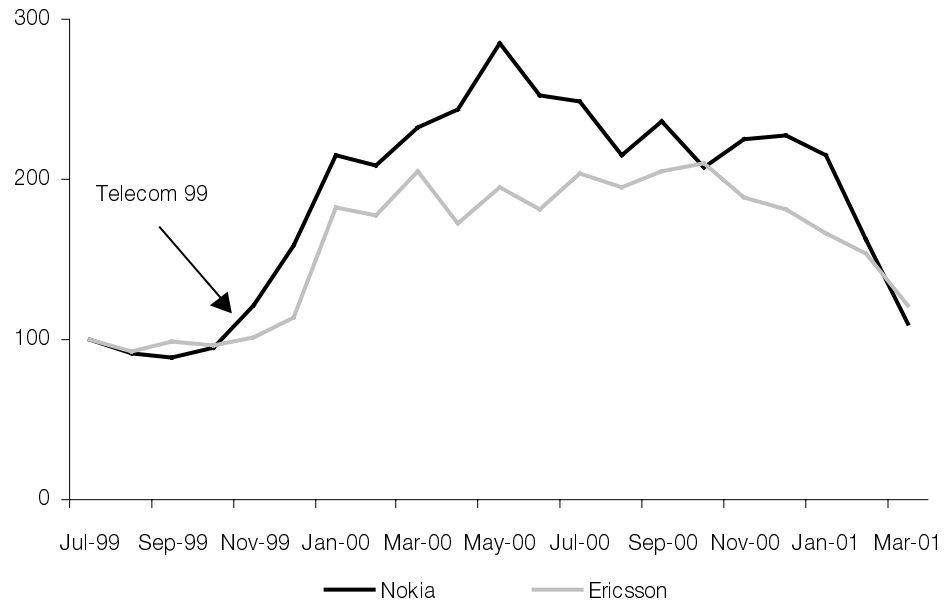

Source: Digiq

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Nokia & Ericsson Rise After Telecomm 99 (share price rebased)

Source: Datastream

The arrival of the internet into the wireless space represents a significant disruption which the mobile industry will struggle to control. If anyone questions this view, they only need to look at the havoc wrought by the internet in the fixed line world. The internet protocol (IP) will become the standard transport for all computer networks and eventually all voice and data will travel as packets. This will drive down voice and data charges and remove many of the barriers blocking competition in the mobile arena. Product life cycles will shorten and even large companies will need to buy in significant amounts of design and technology. This scenario is of course old news for personal computer and consumer electronic companies who have to survive on operating margins below 10%. These margins are a long way from the 20% operating margins some mobile equipment manufacturers are now making on handsets. If we are correct the mobile equipment industry, and operators face a bleak few years as they readjust to hyper-competition. Investors who want to glimpse the future should study the history of IBM following its launch of the PC in 1981. IBM was unable to control the forces it had released and subsequently suffered a decade of decline as the result.

Competing in internet time

The illustration below gets to the core of the problem. The world wants cheap bandwidth but mobile networks are not addressing this need. Instead, as we can see with services such as SMS, the cost of carrying data is actually increasing. This situation is not sustainable in a world dominated by internet standards. The most difficult task facing mobile equipment makers and operators will be to compete in 'internet time'. Internet time results in rapidly dropping prices and a breakneck pace for both product and service innovation. The mobile phone industry, in common with the fixed line phone industry before it, is used to imposing structure and standards from above in its own time. This approach is, in our view, unlikely to succeed in the era of mobile data. As an illustration of the kind of threat that the mobile industry will find itself up against we would like to dwell a little on 4G services. Interestingly, there was little said about this technology at Cannes; but then, investors would have found little discussion about the internet at Telecom Geneva in 1995.

As we now know in the post Cannes world, 3G will not become a feature on the European mobile landscape until mid decade. Siemens estimates that by mid decade only 15% of European subscribers will be using 3G. We suspect that this may slip because 3G technology, particularly the handset, is proving difficult to design. As we will see later, GPRS has around twice the complexity of GSM and has proved extremely difficult to manage. 3G handsets will need to

operate with existing GSM and the newer GPRS standards, as well as offering digital radio and Bluetooth. Future handsets may also require a Wireless LAN modem which adds further to complexity. In other words, conditions are ripe for yet more delays.

Until well into the second half of the current decade 3G is likely to be confined to metropolitan areas while less powerful GPRS networks will be used to offer data services across the country as a whole. In our view it is in the densely populated urban areas where 3G will find itself competing with Wireless LAN. The trade-off for subscribers will be between an expensive technology that offers mobility, but which is unlikely to offer enough bandwidth for data intensive applications, such as running video images or large file downloads.

Mobile increases costs of bandwidth
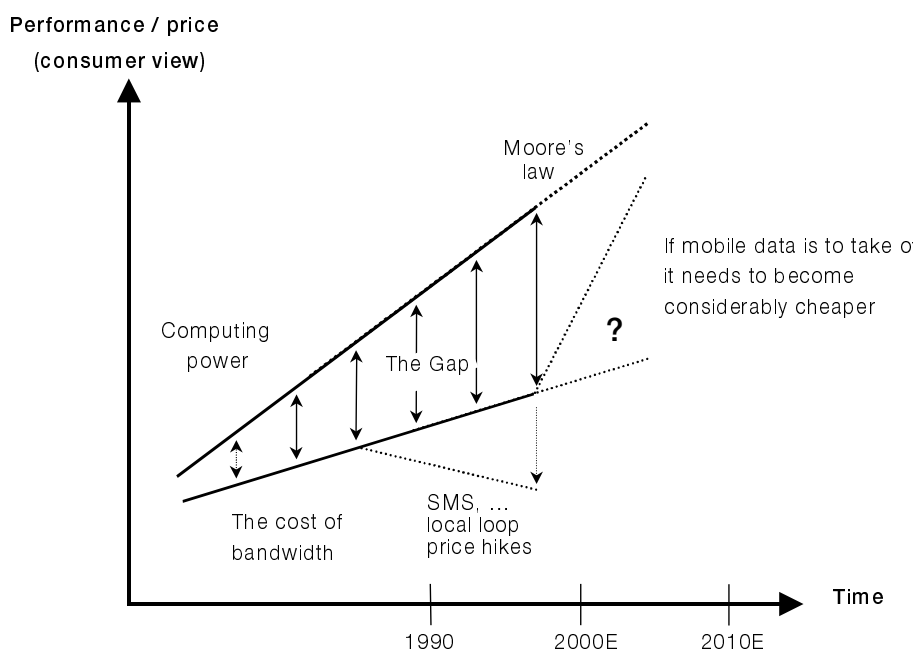
Source: TietoEnator and Nomura

In the early days of 3G the popular image was of a mobile network capable of delivering streamed multimedia to handsets. It was widely claimed that 3G could offer 2 Mbits of bandwidth, but we now know this claim is not credible. That 2 Mbits will have to be shared by all the users within a mobile cell site and the data rate drops considerably the further away from the base station the user is. The initial speed of 3G networks in Japan and the UK is expected to only be 64 kbits a second. Over time it is hoped that this might rise to half a megabit a second. Over time means after 2005.

Problems

We can see two problems for 3G in relation to the 4G networks we are about to describe. Firstly, what will be the need for mobile customers to receive data intensive services while they are on the move? In a country such as Japan, where people can spend a significant proportion of their time travelling by public transport subscribers have the time to watch video images on their phone and to play computer games. By comparison, in a country like the USA, 70% of mobile phone calls are made from behind the steering wheel of a car. In a truly mobile environment it may be difficult to use many of the data rich services being dreamed up by mobile executives.

The best place to access a data rich service, such as graphically intensive computer game, or an MP3 music file, might be while the subscriber is sitting in a coffee bar like Starbucks or waiting in an underground station or airport. Here, the best pipe is likely to be supplied by Wireless LAN not 3G.

Our second concern relates to the leitmotif of this note, which is the impact that the internet will have on the mobile world. 3G is expected to arrive, sometime around the middle of the decade, this lag gives 4G technologies time to gain a grip. We are not saying that this means that 3G will be dead on arrival but it might be gasping for breath due to presence of cheaper 4G networks which will be in a position reduce its oxygen supply.

Weightless Economy

4G technologies, such as the 802.11b Wireless LAN standard and Bluetooth, operate in the unregulated 2.4 GHz spectrum. Both these technologies are able to carry voice and video as data packets and so will be able to undercut the main source of revenue on a mobile network.

The problem for mobile networks is that they are highly regulated and as we have found, in the wake of the 3G auctions, they will be expensive to run. As an observation, both entrepreneurs and engineers like to work in areas where regulation is lightest. This is the true meaning of the 'weightless economy', it's a place where there is little bureaucratic interference.

The cost of a Wireless LAN base station using the 802.11b standard is roughly €1000 which is roughly one tenth the cost of a basic mobile base station. In doors an 802.11b base station could cover a 50 meter radius, out of doors its about 100 m. Improvements in antenna technology mean that distances in the open air can actually stretch into the kilometres if line of site with the base station can be guaranteed.

As an illustration, the DM97 billion raised in the German 3G auction could have bought 60m Wireless LAN base stations. If we work on the basis of a base station every 77 meters, there would be enough to cover Germany with high speed wireless broadband. Today this standard allows the transmission of data at rates of 11 Mbps a second. Within a few years the expected move to the 5 GHz spectrum is likely to push the data rate up to 54 Mbps per second.

Bluetooth

The most likely configuration of a 4G network would be for the use of low power Bluetooth technology, which also uses the unregulated 2.4GHz spectrum, to synchronise devices. Bluetooth can also be used to create home, or small private networks. The advantage of Bluetooth is that it was designed to be cheap and operate at low power. Bluetooth chips consume just 10 mili Watts of power and may eventually cost less than $5. Today the available bandwidth on a Bluetooth system is around 722 Kbits but in the near future Bluetooth 2 will offer speeds more comparable to the 10 Mbits per second found on most Ethernet networks.

802.11b

One important problem with both 802.11b and Bluetooth is that both standards interfere with each other. While Bluetooth was designed to work in small, battery powered mobile handsets, 802.11b was designed to work with lap top computers. In comparison to Bluetooth, 802.11b consumes about 100 mili Watts of power, which can kill the operation of a Bluetooth device working in the same location.

However, there are US based companies that are attempting to develop chips that integrate both technologies. It is therefore possible that the two standards might co-exist. Bluetooth has a frequency hopping facility that may facilitate this. For instance Bluetooth transmissions have one hundred different frequency bands and can hop frequencies whenever interference is encountered.

The greater power of Wireless LAN means that it is more suitable for networking entire buildings and open areas in cities, towns and campuses. Today the technology can only work with Note Book size computers, but it will be able to go into smaller devices as Wireless LAN chips become more integrated. One company to watch in this area is Proxim, a US based chip company which has been leading the development of Wireless LAN.

GPRS

When subscribers need to access data services when they are mobile, or in less densely populated areas, GPRS is likely to become the preferred technology. Mobile operators are able to overlay GPRS onto existing GSM networks. GPRS enables GSM infrastructure to carry data and voice in packet form and so can be threaded together with Bluetooth and Wireless LAN to give complete coverage of a population for considerably less cost than a new 3G system. One estimate we have seen is that the cost of covering the UK with GPRS could be as high as £100m. By comparison it would cost billions to roll-out 3G across the country.

IPV6

In a world where the internet protocol – IP – is the standard for all networks, subscribers will want to access their favourite services wherever they are. By 2010 it has been predicted by Vinton Cerf, one of the men credited with having created the original internet, that all data and voice traffic will travel in packet form. Today, most voice travels in circuit switched networks.

In the near future the mobile network will simply become an extension of the internet and will act as a gateway to the services available on a personal computer, interactive television or a notebook computer or PDA.

One of the important standards that will permit this is the new IPV6 version of the internet protocol. The current standard is IPV4 which has been in existence since 1981 and can so be compared to the old DOS software used on the first IBM compatible personal computers. By comparison IPV6 can be compared to the 32 bit Windows operating system which increased the amount of memory, and so power, available to the developers of software programs. This enabled the creation of rich graphical user interfaces, which in turn enabled tens of millions more people to use personal computers.

The first advantage of the new standard is that it will permit every device on the planet to have its own IP address. Today's IPV4 is about to run out of addresses which would pose a serious problem in the era of mobile data when each cell phone and PDA will need to be connected to the internet. In an IPV6 world every phone would have its own e-mail address. IPV6 will also make it easier for the creation of Peer to Peer (P2P) networks. Such networks will enable devices to communicate directly with each other, instead of operating in a client server relationship or needing to go through a central switch in order to establish a link with another device.

The new standard will also enable more information to be posted with each packet that is transmitted over the network. This means that network routers will have a better idea of the nature of these packets and so prioritise delivery. Today the internet is rather like some national postal systems, it can guarantee to deliver a packet but not the time of delivery. This failure is now important if voice and video are to travel in packet form. In the old days of the internet it did not matter if e-mails were not delivered in real time, but real time is a must have if voice communication is to be used.

25,000 delegates in search of a plot (apologies to Pirandello)

The Cannes conference attracted 25,000 mobile phone industry delegates. A survey of the discussions held in corridors, bars and the more formal meetings threw up the following: 3G and mobile data will only take-off when the right services and content have been developed. Like all truisms this is banal and carries no real insight. You might as well say a phone only works if it has a battery. If this is the best the mobile industry can come up with it does not bode well for the future.

No Longer A Single Product

The move from simply dealing in one product, voice, will be difficult for many mobile companies to manage. By the mid decade, when 3G is expected to arrive the IP and TCP protocols on which

the internet is built will become the standards of the wireless and mobile world. This will mean that the full range of services available on the internet will be accessible in the wireless space. For instance, file sharing, database access, e-mail access, calendars, printing, remote administration, virtual private networks and intranet access.

In a world dominated by the IP subscribers will find it easier to create communities of interest. The services, content and applications that they use will define such communities. Today the largest of such communities belong in the internet world. If mobile operators are to make a decent stab at offering new services in the 2.5G and 3G world they may need to come to a rapprochement with some of the giants of the internet space. Companies such as AOL, Yahoo and Microsoft might hold the keys to success. Equipment makers, such as Nokia, with its Club Nokia, and Sony, are certainly aware of the need to position themselves as suppliers of content and services. With one or two exceptions operators have been slow to recognise the trend. Instead they continue to focus on the fact that they have a billing relationship with their customers, which guarantees their success. In the old days banks might have thought that they owned their customers because they sent them financial statements. Financial deregulation has proven that belief to be false. How many people use their Bank for investment advice, a mortgage or even high interest bearing accounts?

Walled Gardens and all that.

At Geneva, the case for delivering mobile internet via 3G phone systems was accepted with little argument. If Geneva had a mantra it was about customer ownership and walled gardens. Mobile operators were determined not to lose control of the customer to competitors from the internet world, and equipment makers such as Nokia who have invested considerable sums in brand names and customer loyalty. However, the failure of WAP, due to a lack of content and services, has unsettled the mobile industry. This explains the new obsession with content and services and a renewed emphasis on increasing revenues from existing voice and Short Message Service – SMS- technologies.

Rolling back the years.

At Cannes, Orange's chief Hans Snook, donned his trademark black leather jacket, rather like Johnny Hallyday–still a big in the South of France – and tried to roll back the years. His speech was a crowd rousing statement about the coming mobile society. With a flourish he showed a video of what that society might look like. You can guess the plot: we saw the Y generation, those under the age of 25, running their entire lives from a mobile phone. At the end of Snook's picture show the French compere remarked how refreshing it was to hear from a businessman with vision.

Yet by the time Snook had quit the stage the gloom was starting to return. The mobile phone industry is losing its nerve. Everywhere you look you find doubt where before there was certainty. This mood is not helped by the growing number of critics from the US and Europe who question the need for 3G at all.

Snook's company is one of the few to have grasped the full potential of the mobile phone and the sovereignty of brand in a life style dominated market. The future he believes in could arrive, but mobile operators may not dominate it. A fresh wind is blowing from the US, a country that has so far turned its back on the benefits of a unified mobile market dominated by the GSM standard. In America, pragmatism goes a long way. Why, some of their entrepreneurs ask, do you need all that expensive infrastructure, when most people in the West live in big cities? Their desire for bandwidth and internet services might better be served by cheap, high speed wireless networks using 802.11b or Wireless LAN and perhaps digital radio for the broadcast of video clips and music files.

New Devices

In the IP dominated world operators are likely to find it difficult to build customer loyalty and equipment makers will find themselves under attack from both Japanese consumer electronic and US handheld computer makers. Inevitably in mass consumer markets, which mobile data will address, most of the customers will be new and inexperienced. These new consumers will require terminals that are simple to use. One sure way of providing simplicity is for devices to become application specific. The creation of the Bluetooth standard, which is a wireless technology aimed at providing connections over short distances, does away with the need for cables. Bluetooth, married with software such as the new SyncML standard, will enable different devices to synchronise with each other. Phone handset makers will not thank us for saying it, but highly specified smartphones that operate as Personal Digital Assistants –PDAs- may not be what the market wants. A phone, with some limited data facilities, but sold for a cheap price, might be all that consumers need as long as it can link to a cheap E-Mail and text messaging terminal that may look like a Palm Pilot.

Cybiko

Another clue as to what the future might hold is the Cybiko text messaging terminal that is currently proving a hit with the youth of America. Brightly coloured Cybiko terminals allow users to transfer MP3 files, games and messages. Each device can communicate with up to a hundred other Cybikos and so form communities of interest. AOL, the world's largest internet company is one of the investors in Cybiko.

Generation Y

The Cybiko is evidence that some device makers are waking up to the opportunity represented by the popularity of SMS amongst what is becoming known as Generation Y – those in the 15 to 25 age group. In a country such as France, 66% of this age group has a mobile phone compared to 50% for the country as a whole. In Scandinavia, the figure is almost 100% of this age group.

Although this age group does not have as much to spend as an executive on expenses communications expenditure is their third most important budgetary item.

On the evidence of Cannes, the be-suited executives of the mobile phone industry are having problems understanding this age group. Even NTT DoCoMo initially got it wrong when it launched the I-Mode service. At first it was believed that I-Mode would appeal to business executives who would use it for 'useful' tasks, such as finding out the price of shares. Reality, as is often the case, ignored the predictions. Half of all I-Mode users are below the age of 25 and instead of share prices they are more interested in downloading cartoon characters and a different ringing tone for their phones.

Generation Y represents the early adopter market for new data based services. If mobile operators, or device makers can win this age group's allegiance they will have captured valuable customers that they can track throughout their lives.

The problem is that Generation Y is fickle. In the United Kingdom 60% of the 15-25 age group have a prepaid package while in Italy it is 80%. Budget management is the key reason for the popularity of prepaid amongst this age group. The problem for mobile operators is that prepaid packages increase customer churn. Inevitably, it is difficult to capture much background information about prepaid customers on the operator's billing system. Even if most of the anti-churn systems are using billing information to capture user profiles, these tools are useless on what is becoming the operator's most important customer group.

The trade-off between high and cheap bandwidth and mobility
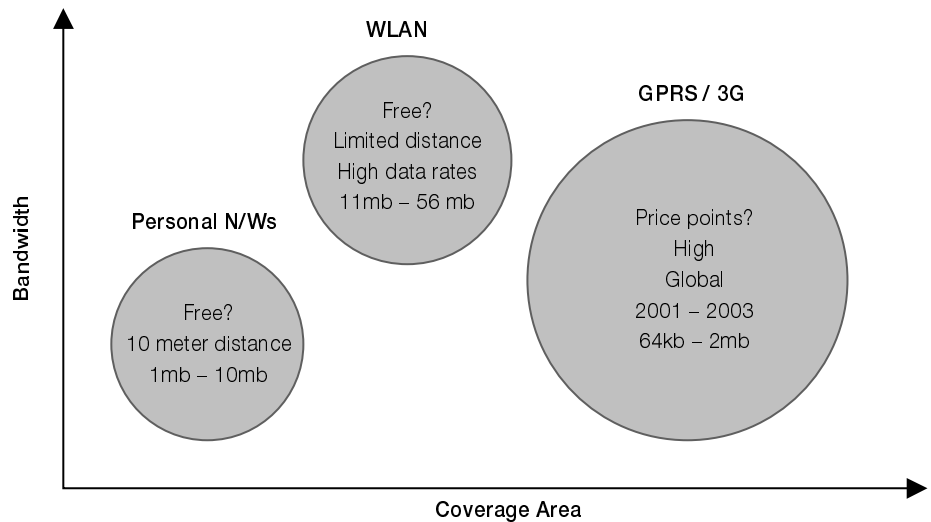
Communities

The graph above gives an outline of trade-off between greater bandwidth and data rates. High bandwidth technologies such as Wireless LAN and Bluetooth are, in our view, ideal for the creation of communities because they satisfy the life styles of people who live in densely populated urban areas.

The key to building loyalty, as well as gathering more information to improve the profile of this consumer group, is probably to develop communities of interest. This is what works on the internet, where from the earliest days chat rooms, and multi-user games and interest groups have been popular. The problem for investors is that mobile operators are slow to recognise this. Instead, they still harp on about having a billing relationship with the subscriber that will enable them to profit from the move to mobile data. It is quite remarkable how operators ignore reality, when it comes to this key age group they do not have a billing relationship.

This does not bode well for the arrival of mobile data services, which are, in our view, going to extend the internet's ability to create communities. Mobile phones, as operators should realise, are personal and are often used as an extension of one's personality. In the mobile data era this characteristic can be built upon through the use of features such as location aware networks to build on the urge of young subscribers to develop and be part of communities.

The Challenge

Yet it is not only operators who are faced with this challenge. In our view devices such as the Cybiko point the way to the future. Application specific devices will be increasingly used to form communities of interest. In metropolitan areas, where population densities are high, Wireless LAN networks can serve these communities and ad-hoc P2P networks where devices communicate machine to machine without the need to go through a backbone infrastructure or a central switch. Therefore, in our view an increasing amount of wireless traffic will take place out of earshot of the mobile operators' billing systems. Mobile phone makers can no longer take it for granted that their infrastructure and handsets will be the most popular mode of communication for highly mobile, cost conscious, Generation Y subscribers.

Handset Makers

It is early days, but so far mobile handset makers have not shown a convincing ability to develop mass-market data devices to rival the success of the Palm Pilot. The success of the PDA is built upon having a larger screen than phones offer, a simple user interface and good synchronisation with a desktop PC or the internet. Early models from handset markers have failed to grasp some of these design fundamentals. Another area of weakness is the lack of memory and computer power available on mobile phones. Handheld computers can now offer consumers 16 Megabytes of memory, whereas data phones we have seen only offer a couple of megabytes of memory.

Network Equipment

Network equipment vendors will be squeezed if the recent trend of sharing network infrastructure spreads. In future, the widespread adoption of IP may make it easier for operators to share the switching infrastructure as well.

However, the real risk is that mobile technology will be over taken by innovation in the unregulated 2.4Ghz and 5Ghz spectrum bands. In areas of dense population it may be possible to for clusters of users of Wireless LAN networks to form communities across an entire urban area without once going through the billing system of a mobile or fixed line operator. It is early days, but developments in the peer to peer –P2P- space and in the design of adaptive, hierarchical networks are a threat to established mobile telecoms companies

The internet standardises the transmission of data and voice packets. Typically this causes a fragmentation of an industry value chain and enables new or existing players to focus on one element, such as a piece of networking equipment like a router. This fragmentation leads to greater competition, lower margins and shorter product life cycles. Today, mobile equipment makers are

more integrated than most data communications and computer companies. We would expect this to change as internet technology simplifies ever greater parts of mobile networks.

However, there are still areas where value can be added. For instance, there will be a need for real-time routers capable of carrying voice and video. The creation of enormous data networks, comprising millions of mobile phones and PDAs will also spark the need for better network management software. Quality of service –QoS -will become an important issue as networks need to find a way of giving priority to some data packets over others. The arrival of virtual mobile network operators will also drive the need for QoS software as they will require service level agreements from their bandwidth suppliers.

Is Nokia the IBM of our times?

How many companies, how many industries survive and prosper when they encounter profound technological change? In 1981, IBM launched the world's first standard personal computer. Several years later the company's leader John Opel predicted that IBM would continue growing at 15% compound until the turn of the century. Leading magazines, such as Business Week and Time ran articles trumpeting IBM's achievements. In those days IBM was widely regarded as the best run company in America. It was in touch with its customers and had a 70% share of the mainframe computer market. IBM was also on the case as far as new fads such as the PC were concerned.

Yet, for all IBM's excellence it failed to successfully migrate into the new world. The same problems have beset the leading electronics companies of the 1950s and 1960s. Giants such as RCA and GE failed to master changes in technology when valves gave way to solid state electronics. Now the mobile phone industry, both its operators and equipment makers, face changes every bit as momentous.

IBM Share Price Post PC Launch Relative To S&P500 Composite
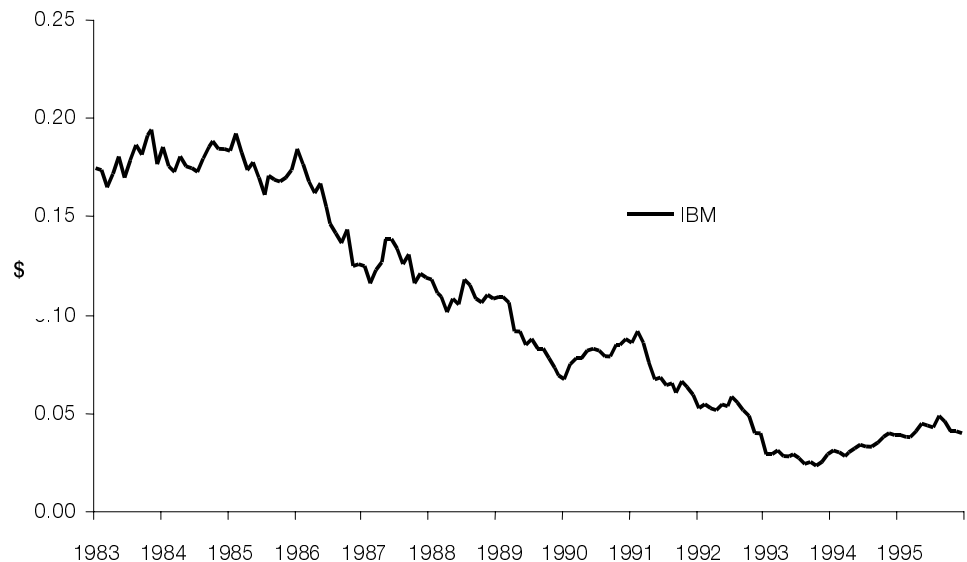
One of the mistakes these companies and investors have made is to misunderstand the dynamics of a disruptive technology. We believe Wireless LAN, like the PC before it, is a disruptive technology. When a disruptive technology emerges it is usually less sophisticated than the entrenched technologies it competes with. Personal computers offered less power and sophistication than mainframe computers. Famously, Ken Olsen founder of DEC, which used to be the world's second biggest computer maker, said in the mid 1980s that PC were unlikely to be successful because they could not communicate. Olsen hit upon a truth, but what he missed was the fact that communications, more power and graphical user interfaces would soon be featured on the humble PC. This is an important rule when dealing with disruptive technologies - do not judge them by what is available today – imagine how they can develop.

Entrenched giants dislike disruptive technologies because they offer lower margins and their existing customers are often put off by the lack of features. Therefore, do not be surprised to hear the heads of mobile operators and equipment makers trying to dampen enthusiasm for Wireless LAN. They will say that the technology does not offer as much mobility as 3G, or that it is more cumbersome and drains battery power of small handsets. Engineers are excellent at solving these kinds of problems, in the meantime users, new equipment makers and new operators are likely to rush to exploit a technology that offers considerable power at a cheap price.

GPRS and the failure to keep promises

 American Wireless LAN entrepreneurs have found some allies in Finland, the cradle of the GSM generation and Nokia's back garden. A new wave of operators, such as Jippii and more established operators such as Telia in Sweden, are experimenting with the new wireless standard. They feel they have time and technology on their side. The mobile phone industry could be accused of preferring hype over substance. Mobile equipment makers have primed the market for wireless data but are slow to deliver the nuts and bolts that are needed to build the service. For their part operators hyped Wap as the coming of the mobile internet and then failed to develop captivating services.

Those long promised GPRS handsets are a year or more late and when they finally arrive they will not be able to offer the data rates initially promised. Instead of 115 kbits per second, the average data rates on GPRS systems is likely to be around 27 kbits.

We were also promised an always-on connection with GPRS, but as some engineers have pointed out, if everyone were offered an always on connection the network would crash. Instead, users will need to log in to a GPRS service and each time they do it is likely to take more than 20 seconds. As an executive from Alcatel pointed out in one technical session, it will be hard to improve on the time it takes to log in. This does not bode well for the introduction of GPRS services. Hans Snook's 'IT' generation prefers instant gratification to network 'handshaking' time.

The technology, in particular the GPRS software protocol stack used in the mobile phone, has proved a handful for engineers. Then, as is the way with new, immature technologies, there has been a lot of tinkering with the standard that has added to delays. This software is twice as complex as the GSM protocol stack, so welding the two together is proving bothersome. Now, we are assured that GPRS terminals will arrive during the second half of the current year.

Nokia holds the key

The company holding the key to GPRS' success is Nokia. The Finnish giant has a third of the handset market, and outsells its nearest rival by a factor of two. However, the early adopters of mobile technology are no longer businessmen but customers below the age of 30, here Nokia's market share is closer to 50%. Nokia says it will not be launching GPRS handsets until the final quarter of this year. On the Nokia stand at Cannes the word was that you shouldn't be surprised if Q4 became Q1 2002.

Delivering the phones might be the easy part. As the mobile phone industry seems to have just realised someone then has to devise a service that is compelling. To design a compelling service you need to understand your customer. Can we say this of mobile operators, the people who manage to lose, on average, a third of their customers every year to their rivals.

The dawn of GSM and the lesson of SMS

At the time of GSM's launch in 1992 there was talk about how it would be the midwife to new value added services, such as weather forecasts. GSM offers two data channels, the unstructured data channel that can be used for interactive services and can support text messages of around 190 characters, and the Short Message Service –SMS- channel. While the unstructured data channel has found limited use, SMS has, over the last couple of years, become a big hit with Generation Y.

Mobile operators might not like to admit it but SMS is a grass roots craze, as good an example of viral marketing as you can find. Young people have been able to adapt the limitations of their mobile handsets to create a kind of text based pidgin language. Last Christmas 15 billion SMS messages were sent, growth is still exponential. SMS has taken most mobile industry executives by surprise. The key to the service's success has been that it fits perfectly with the life style and habit of its users, who are mainly below the age of 25.

Nokia, not mobile operators, was quick to see the value of SMS and the company has equipped its handsets with useful T9 predictive text software. This eases the chore of using a small alphanumeric keyboard to write a message. Nokia has also made it possible to send simple graphic images from its handsets.

In terms of units of bandwidth SMS can earn an operator a thousand times more revenue than a voice call. The financial return earned by SMS is about five times the initial investment on the SMS switching centre software and hardware. However, things need to be put in perspective, SMS only represents about 5% of network revenue and prices are likely to drop sharply if it is to become more widely used.

Subscribers create their own content

SMS has an important lesson for a mobile industry, which is investing tens of billions of dollars to bring mobile data services to the masses. Firstly, instead of value added services, such as weather forecasts, the masses preferred messaging. SMS, just like E-mail, allows subscribers to create their own content instead of buying value added service from an operator. If simple, cheap messaging remains the preferred service on the bright new 3G and GPRS networks operators will have problems because while network traffic will increase it is unlikely to generate significant revenue. The task for operators, as Don Listwin, the chief executive of Openwave, a US software vendor, said is to start by offering subscribers the messaging services and then attempt to offer other services for which they can be charged.

Companies such as Nokia and Logica believe that multimedia messaging, which means text, voice and images, will prove to be a popular service that the industry is waiting for.

The Systems Integrators

From the point of view of UK investors in the software sector, the move to GPRS – 2.5G and 3G services is important. In the early days of mobile telephony about 75% of the cost of rolling out the networks was taken up by systems integration. This has since fallen to 45% and is likely to fall further as the industry moves further towards networks based on the IP –internet protocol. The fall in amount of work available for systems integrators has been off-set by the move by successful companies, such as Logica and CMG, into SMS.

Both Logica and CMG are now the world's leading providers of SMS switching centre software. Logica dominates the Far East and Japan, where messaging took-off early. By comparison, CMG is the leading provider of SMS software to European GSM vendors. More recently, CMG has succeeded in breaking into the world's largest GSM market, China, where SMS is beginning to take-off.

Both companies are also likely to benefit from the introduction of SMS into the Americas. Brazil has confirmed its move to GSM mobile systems and the country's high proportion of young people and Latin culture, seem well suited to the text messaging culture. In America, AT&T Wireless, one of the leading operators, has also decided to standardise on GSM.

It will be interesting to see if both CMG and Logica can repeat their great success in SMS in the new multimedia and unified messaging markets. Success in one technology is not a guarantee to future success. As we have seen SMS took-off largely unnoticed and the two UK quoted systems integrators did not encounter that much competition. Now, numerous other software vendors, such as Openwave, Comverse and equipment makers such as Nokia, are keen to develop the newer messaging systems. Logica and CMG may be successful in future, but we doubt that they will be able to capture as much of the newer messaging markets as they captured of SMS.

The Logic of 3G

After all this criticism of 3G it might be worth reviewing what it is the technology is aiming to deliver. The aim of 3G is to become a platform capable of integrating different technologies and standards that will enable operators to deliver broadband services to the mobile phone. Broadband will enable mobile operators to offer a range of services, applications and content to mobile users that will supplement voice revenues. One way to grasp broadband is to compare it to the move from still photography to movies. Today the internet is largely about accessing static data. In the broadband world we will have an always on connection to the internet. This 'living' connection will enable us to receive real time information. Therefore, instead of simply access static content we will be able to receive services, applications and live media, such as video. Instead of just viewing a Bank account we will be able to carry out a transaction.

The cost of 3G

Below is list of some key statistics regarding the cost of 3G systems.

- 3G licenses in Europe have cost around €130bn.

- Capital expenditure to roll out 3G networks is likely to be between $150bn to $300bn.

- 3 G networks can carry at least twice the amount of voice traffic as a GSM network.

- The cost per subscriber of 3G systems in Europe will initially be about €1000 and is then expected to fall to around €300 per person.

- NTT DoCoMo estimates that it will cost $10bn to build its 3G and it will take 4 years to become profitable.

The case for 3G

In summary, the case for 3G is as follows: today mobile voice revenues are running at $250bn and declining. However, the introduction of 3G services such as mobile multimedia, mobile intranet and extranet access and personalised information and entertainment is expected to add $160bn of new revenues for mobile operators by 2010; according to Motorola.

By 2010 some estimate indicate that there will be almost 2bn 3G users and sometime during the middle of the current decade there will be more mobile internet devices than fixed internet devices.

On average mobile phone call rates are declining by 16% a year across Europe and customer churn is running at around 30% to 40% a year. These two drags on revenue have been disguised by the fact that mobile subscriber growth has been so rapid. For instance, last year mobile subscriber growth in Europe was more than 60%. However, with average penetration rates across Europe now more than 50%, subscriber growth is decelerating. This year the consensus estimate for subscriber growth is of the order of 20%. Therefore, operators need a way to offset falling call charges and reduce churn rates. The introduction of 3G and GPRS (a packet based variation of existing GSM networks) ought to solve this problem by enabling operators to carry a broad range of data services. These new services should increase the average revenue per subscriber –ARPU while also building loyalty and so reducing customer churn.

If we use the estimates of Professor Olli Martikainen of the Helsinki University of Technology, today fixed line telephony services in Europe represents around $130bn of revenue, which is expected to fall slightly by 2010. By comparison, mobile services today represents about $40bn of revenue in Europe. Viewed another way, mobile only represents about 20% of the voice calls made as measured by minutes. By 2010 mobile is expected to grow 50% to $60bn of revenues, still only half the revenues generated by fixed line voice traffic. Over the same period mobile data is forecast to grow from roughly zero to between $10bn to $20bn of revenue.

Wireless LAN is good news.

The mobile internet is likely to emerge as one of the most important product cycles of the coming years. However, as 3G networks are yet to be built and face considerable technical problems, there is a risk the technology industry could face a difficult passage over the coming years. Major product cycles ripple through numerous industries such as: chip suppliers, hardware infrastructure, software products, systems integration, content, device makers and of course operators feel the impact. All these industries are at risk from the slow roll-out of 3G.

Fortunately, Wireless LAN, married to GPRS can offer much that 3G has promised. Mobile operators, faced with the arrival of new arrivals with lower cost bases, due to their failure to win a 3G license will introduce new internet based technologies and so increase competition. In our view a growing number of traditional operators will see that Wireless LAN can help their business because it will enable them to offer sophisticated data services now at a low price.

Successful device makers should also benefit as consumers demand more application specific hardware. The problem is that some mobile handset makers will have to find a way to accommodate considerably lower margins, greater competition and faster product cycles. Successful handset makers, perhaps Nokia, may keep over all levels of profitability high by moving into content and services just as many consumer electronics companies have done in the past.

Appendix

COMPANIES MENTIONED:

Company	Stock Codes	Price 13/03/01
AT&T	T.N	$22.7
Comverse	CMVT.O	$67.0
IBM	IBM.N	$95.5
Siemens	SIEGn.DE	€117.8
Starbucks	SBUX.O	$43.0
Nokia	NOK1V.HE	€24.5
Ericsson	LMEb.ST	€64.0
Motorola	MOT.N	$15.0
Proxim	PROX.O	$17.0
AOL	AOL.N	$39.3
YAHOO	YHOO.O	$16.0
Microsoft	MSFT.O	$51.0
Sony	6758.T	8100 JPY
NTT DoCoMo	9437.T	1880000 JPY
Jippii	JIP1V.HE	€2.7
GE	GE.N	$39.6
Telia	TLIA.ST	€60.0
Alcatel	CGEP.PA	€39.7
Openwave	OPWV.O	$30.32
Logica	LOG.L	1342p
CMG	CMG.L	763p

Notes